INDIA RUBBER WORLD

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Vulcanization

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VULCANIZATION is the name given by the discoverer —Charles Goodyear, in 1839—to the process which put the struggling rubber industry of that period on its feet. Prior to that year this industry was in a most precarious condition, not only for financial reasons but also because of the poor quality of its manufactured products. It was more than 200 years after rubber was brought by Spanish travelers in Mexico to the attention of the European world in 1521, before it really received much attention, and then only as a curiosity. Still another century was to pass before the discovery of vulcanization was made.

The rubber industry can be said to date only from 1819, when the manufacture of rubber goods was begun in England. Machinery for masticating, compounding, and dissolving rubber was developed by Hancock. Waterproofing with rubber solutions or cements was undertaken by Mackintosh. By 1832, or just 100 years ago, the industry had spread to America.

It was the meager success of the new industry which called it to the attention of Charles Goodyear. He noted the instability of the manufactured goods, which became hard and brittle in the winter, with resultant cracking, and soft and sticky in the summer. Though not a trained chemist (there were few chemists in those early days), he set out to remedy these difficulties. With a tenacity bordering on insanity he pursued his researches until success finally crowned his efforts through an accident. He had been trying to overcome the summer stickiness, or tackiness, of rubber by compounding it with white lead and sulphur as drying agents. A sample, so blended, was hung above a stove, presumably for further drying. In his absence, as Goodyear's own account relates it, the sample fell onto the stove and became heated to a high temperature. When Goodyear returned and found his sample presumably spoiled by the accident, his observing eye noted certain marked changes. Instead of being melted by the heat, it had become hardened. The property long sought had been attained. He soon learned that it was the combined influence of heat and sulphur that had effected the result, and the epoch-making discovery was made.

Vulcanization can thus be defined as the process of combining sulphur with rubber under the influence of heat. What actually brings about the remarkable change was a question over which there raged a violent controversy between the chemists and the physicists. The former ascribed it to a chemical change; while the latter, led by the physical chemist Ostwald in Germany, contended it was purely physical, a phenomenon of adsorption. It is now definitely established that sulphur goes into chemical combination, but most rubber technologists now hold to the view that the result is due to the combined action of chemical and physical forces.

The physical changes which rubber undergoes during vulcanization are most interesting. Raw rubber is both a plastic and an elastic solid, the former property largely overshadowing the latter. This accounts for the changes it undergoes with changes in temperature. After vulcanization, the elastic property predominates, and to such an extent that the plasticity is a minor characteristic.

The progressive nature of the reaction is clearly evident when a mixture of rubber with a large percentage of sulphur is heated. For example: if we mix 100 parts of rubber with 50 parts of sulphur and a few parts of zinc oxide, in the presence of certain catalytic agents, or promoters of vulcanization, and heat the mixture in molds at 40 pounds' steam pressure (286° F., 141° C.) for increasing periods of time, products of markedly different properties are obtained. The change is a progressive one, and there is no point in the course of the reaction where definite chemical compounds can be isolated until the end of the reaction is reached. It is found then that sulphur has added in the proportion of one atom of sulphur to one molecule of rubber hydrocarbon, C_5H_8, or one atom of sulphur to 5 of carbon and 8 of hydrogen. At the end of 10 to 20 minutes, in the case cited, "soft" rubber samples are obtained. These are highly elastic and will contain from, perhaps, 0.5 to 3.0% of chemically combined sulphur. Products of this nature constitute those used in the tread and carcass of automobile tires and other "soft" rubber goods, as regards degree of vulcanization. This stage of vulcanization gives products of the greatest value, as there are no substitutes for them. In from 30 minutes to

[1] Director of Chemical Research, Firestone Tire & Rubber Co., Akron, O. Read at the Symposium on Rubber, Cleveland Regional Meeting, A.S.T.M., Mar. 9, 1932. Publication authorized by American Society for Testing Materials.

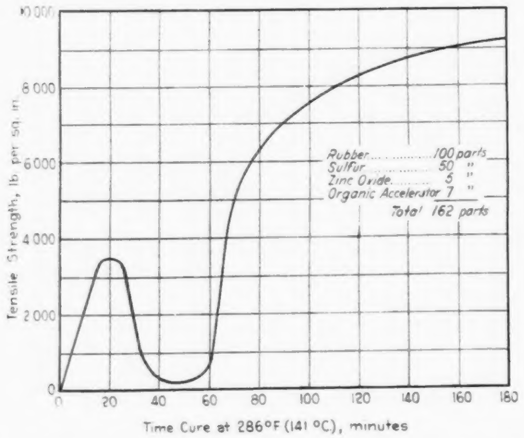


Fig. 1. Progressive Changes in Tensile Strength with Time of Cure

one hour of heating, samples are obtained which are still soft, but very weak and which break with a brittle fracture. Rubber in this stage of vulcanization is worthless, having lost its elasticity to a very large extent. These samples will contain from 4 to 15% of sulphur combined with the rubber. After 90 minutes of heating, the elasticity is practically gone, and a tough, semi-hard product is obtained which, again, has limited commercial value. In from 2 to 3 hours of heating, this particular mix will contain up to 47 parts of sulphur combined with 100 parts of rubber, or in some cases, even slightly more, if substitution as well as addition of sulphur has occurred. These products are very hard and constitute the hard rubber of commerce.[2]

What happens with reference to the tensile strength of this compounded rubber during the course of the process just described is illustrated in Figure 1, where the load required to rupture the sample is plotted against time of cure. The tensile strength rises quickly to a peak, then rapidly falls to a low value. As curing increases, however, the tensile strength again rises, eventually reaching, in hard rubber, a tensile strength as high as 9,000 pounds per square inch of cross section.

The heat which is necessary both to mold rubber articles and to bring about the vulcanization, is a necessary evil. Raw rubber when heated alone first softens, then melts, and finally, if the temperature is sufficiently high, distills, producing among other products a mobile, low boiling, ethereal liquid, known as isoprene. This material boils at nearly the same temperature as the ordinary ethyl ether used in anæsthesia (99° F., 37° C.). This clearly demonstrates that heat is detrimental to rubber. The change is just the reverse of that which is brought about by the chemical combination with sulphur, which stiffens and hardens the rubber. Obviously the duration of the heat treatment should be kept at a minimum so that the minimum deteriorating effect will result. This is where the chemist may be said to have made his first great impress on the rubber industry. He first found that certain chemicals, such as lead oxide (litharge) or basic lead carbonate (white lead) and the oxides of calcium (quick-lime) and magnesium (magnesia) speeded up the vulcanization of rubber, that is, catalyzed and accelerated the change. These substances became known as "accelerators," without which only inferior products could be obtained. It was fortunate that white lead constituted one of the ingredients of the mixture with which Goodyear had his "accident"; otherwise the secret of vulcanization might not have been discovered at that time.

Early in the present century Oenslager discovered a new class of chemicals which have an even greater influence on the rate of vulcanization. These belong to the class of chemical compounds known as organic (carbon compounds) and are spoken of as organic accelerators. Among the early chemicals used were aniline, thiocarbanilide (a reaction product of aniline with carbon bisulphide) and hexamethylenetetramine (the Urotropin, used medically as an internal antiseptic). Additions to the list of active catalysts have made it possible to "cure" (the practical rubber man's parlance for "vulcanize") rubber in a fraction of the time required with the former materials. It is now possible, through the use of certain very active catalysts, to cure rubber in as many minutes as it formerly took hours. Inner tubes of the smaller sizes are now cured in from 5 to 10 minutes, or even less. These same substances also made it possible to vulcanize at much lower temperatures, even at the temperature of boiling water, and in so short a time as from 10 to 15 minutes. At ordinary room temperature, vulcanization in the presence of certain of these substances takes place in a few days, giving products of great strength and elasticity. In addition to the improved quality brought about by the reduction in time during which the rubber must be exposed to the deteriorating effect of heat, these catalysts have specific beneficial influence on the strength and elasticity of the vulcanizate. They definitely improve the wearing qualities, not to mention the marked saving in manufacturing costs effected through shortening the vulcanization cycle.

However not all the objectionable features of rubber were removed by vulcanization. One very serious problem was yet to be solved, and this was the aging problem. Like all materials of colloidal and elastic nature, among which may be mentioned silk, our own arteries, and various other organic materials, rubber loses elasticity on aging. Unfortunately the vulcanization process, which stabilized rubber against rapid change with change in temperature, actually increased the tendency for rubber eventually to lose its elasticity. Raw rubber, unless exposed to sunlight, has a long life; samples of raw rubber can be kept for years, with little or no change, unless subjected to sunlight or high temperature. The vulcanized rubber of 10 years ago might or might not last a few years, depending on the manufacturing care exercised. Oxygen, an enemy of rubber, coupled with physical degradation, caused rapid loss in elasticity, with the result that soft rubber articles became hard and cracked, or in some cases soft and sticky, in a few years. Last year's hot water bottle was found to be leaky. Rubber

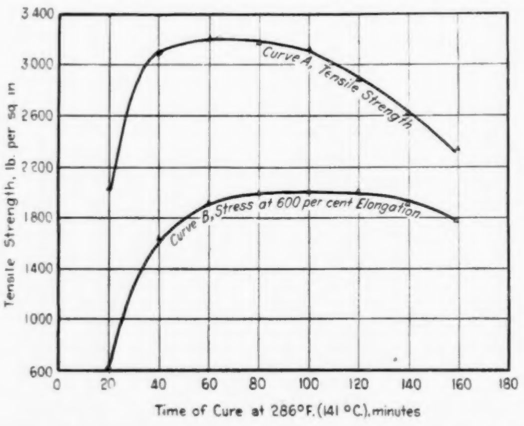


Fig. 2. Relation of Tensile Stress to Time of Cure in a Pure Gum Stock

[2] It should be pointed out that the recipe chosen to illustrate this range of rubber products is not a commercial one, except for hard rubber. The concentration of sulphur in commercial compounds closely approximates the amount which it is desired to combine.

articles kept in a stretched condition, such as rubber bands, garters, or footwear, were found broken, cracked, or inelastic.

While the rubber chemist has not completely solved this problem, he has discovered "antioxygens," or "antioxidants," which protect rubber from this degradation to a very large extent. Properly vulcanized rubber containing these materials, which like the accelerators are organic substances related to aniline (if somewhat distantly), may actually appreciate over a very considerable period, and will retain its useful life over many years. It is safe to say that properly compounded and vulcanized rubber ages from 5 to 10 times as well as formerly.

It should be noted, in discussing aging, that emphasis has been laid by the author on *properly compounded and properly vulcanized rubber.* No amount of antioxidant will preserve a rubber product which has been greatly "overcured." In order to make this clear, curing curves for a soft rubber compound are presented in Figure 2. Curve A represents the breaking stress at the end of the different curing periods. Up to 40 minutes there is a rapid increase in the tensile strength. From 40 to 60 minutes there is only a small increase, and from that point up to 100 minutes the strength remains practically unchanged, or in other words, there is a definite "plateau" in the curve. The extent of this flat portion of the curve is a function of the accelerator and of the concentration of sulphur used. Beyond 100 minutes in cure the strength gradually falls off. The same type of curve is obtained when the stress required to produce a given elongation of the rubber sample is plotted against time of cure (curve B). Obviously, for most purposes, high tensile strength is desirable in a rubber compound. The proper cure for such a rubber mix, as is illustrated, would lie in the neighborhood of 50 minutes, where both stiffness (modulus of elasticity) and tensile strength are close to the maximum. Longer curing will be accompanied progressively by poorer quality. It might be assumed that any cure in the "plateau" range would be as satisfactory as the 50-minute cure. This is not the case. Obviously a long, flat curing range is preferable to a short one where the curing curve has a sharp peak and falls off rapidly. However experience has shown that the curing should be stopped at the point where the maximum tensile strength is first reached, or somewhat short of this. The later cures have poorer initial qualities, as for example tear resistance, and the deterioration on aging is greater.

What has already been stated concerning the influence of heat and of chemically combining the sulphur, will explain the nature of these curves. Up to the peak in the curves, sulphur has been combining, stiffening, and strengthening the product. At the point where the peak is reached, the free sulphur is to a great extent exhausted, that is, has combined with the rubber. If heating is continued, the softening effect of heat, no longer offset by the stiffening effect of added sulphur, predominates, and the compound softens (becomes flabby and loses in tensile strength).

The amount of combined sulphur in the cured product is *not* a criterion of the physical properties. Ordinarily, in soft rubber goods, it should not exceed 2.5%, but the optimum amount will depend on the type and the concentration of accelerator used and on the length of the curing period. However the amount of sulphur combined (the chemical state of cure) is of great importance from the standpoint of aging. High combined-sulphur figures in a soft rubber compound are indicative of overcure and rapid deterioration.

The question is often raised as to the influence of excess free sulphur in the cured product. "Blooming" of the sulphur is visible evidence of an excess of sulphur, for at ordinary temperatures soft rubber goods will hold in solution only approximately 1% of free sulphur, any in excess of this crystallizing both in the interior and on the surface of the article. Aside from the unsightly appearance of such a bloomed article, excess sulphur may be highly detrimental. This holds true where the rubber article is subjected to high temperatures during service. If the temperature is sufficiently high to cause vulcanization to continue, the product will become brittle and weak. On the other hand extremely low combined sulphur with no free sulphur present, will, under high temperature conditions, result in softening or reversion of the compound, again with accompanying loss in strength. Of the 2 evils, the latter is less to be feared in general. For most purposes a non-blooming product is preferable to one which blooms.

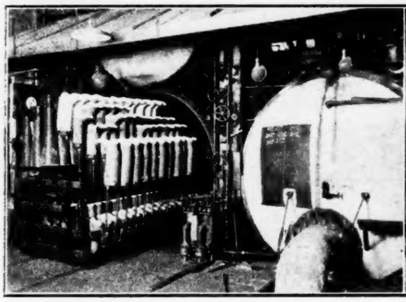


Fig. 3. Pressure Curing Rubber Boots

Fig. 4. Open Steam Curing Radiator Hose

Fig. 5. Platen-Press Vulcanizing Tire Beads

It seems logical that the lower the curing temperature, the better the quality of the product. It is the writer's opinion that this is true because there is an unmistakable trend in this direction in the available data. Of course, if the curing temperature for a given compound is low, the duration of the cure must be increased very appreciably over that required to produce the same state of cure at a higher temperature. If the time and the temperature of cure are properly balanced, the initial properties at proper cure are approximately equal. However it must be taken into consideration that the thickness of an article modifies the actual curing conditions which must be adopted. The heat conductivity of rubber is low, (0.00032 cal. per cu. cm. per second)[3] so that in thick articles even where heat is applied from both sides, the problem of obtaining uniform cure throughout the article is a serious one. A low curing temperature, requiring a longer time of cure, is advantageous from this standpoint as it allows the heat to flow into the center of the article, effecting a satisfactory cure there, without overcuring the exterior. With very large or thick articles, a long curing time is an absolute necessity. Prior to the discovery of accelerators which provide a broad curing range and permit curing at lower

[3] I. Williams, *Ind. Eng. Chem.*, Vol. 15, p. 154 (1923).

Fig. 6. Autoclave Tire Curing

Fig. 7. Jacket Mold for Tire Curing

Fig. 8. Jacket Tube Press

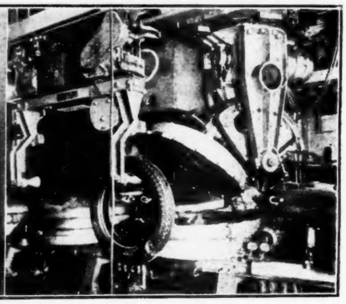


Fig. 9. Jacket Mold for Vulcanizing Tires with Conveyer

temperatures, "step-up" cures were necessary, as, for example, a cure such as the following:

100 minutes at 240° F. (115° C.)
80 minutes at 270° F. (130° C.)
85 minutes at 300° F. (150° C.)

There is a distinct trend in the industry today toward lower curing temperatures.

While there is no great difference in initial properties, there is a definite trend toward better aging of products cured at lower temperatures. However the selection of the curing temperature should be influenced by cost (as the longer cures necessitated by lower temperature of curing decrease the production per unit of curing equipment) by the thickness or size of the article, and by the severity and nature of the service conditions to which the article will be exposed.

The author has been asked to discuss briefly the methods employed in curing rubber. This topic could easily be made the subject of an extensive paper. Suffice it to state that vulcanization may be effected in hot air, in hot water, in open steam, in molds in platen presses under hydraulic pressure, in autoclaves where the molds are closed and held under hydraulic pressure, and in jacketed molds. Some of these methods of curing are illustrated in Figures 3 to 9. Each has specific applications, and it cannot be said that any one process is superior for all purposes. In general, hot air as a heating medium is used only where necessary, as, for example, in footwear manufacture. Air is a very inefficient heating medium and, unless circulated at high velocity and under pressure, leads to porosity in the product and non-uniform cures in the various parts of the oven or heater, together with deteriorated properties owing to oxidation.

The Idometer

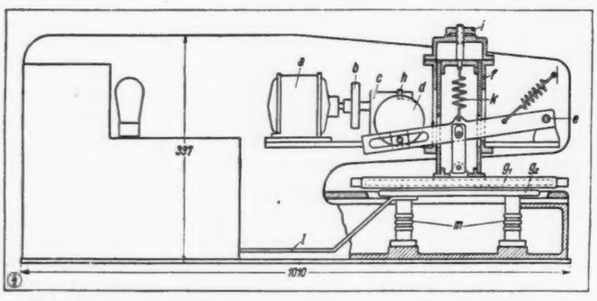
MUCH interest was shown in the brief description published in INDIA RUBBER WORLD, February 1, 1932, of the Idometer, a German electrical measuring instrument for indicating accurately variations in the thickness of the rubber layer on proofed fabrics.

The Idometer is essentially a condenser through which the rubberized fabric is passed. The capacity of the condenser changes with the variation in the thickness of the rubber layer.

Figure 1 presents a section through the instrument and shows the construction of the measuring condenser as well as the arrangement for raising the upper condenser plate. Letters *a, b, c, d, e, f, k, g,* represent the lifting device; g^1, g^2, the condenser plates; *l*, the current relay; and *m*, the insulators.

Frequently there are thickened places in a length of rubberized fabric, and to permit the passage of such parts the upper plate is lifted by the man at the calender either by pressing a button or by distant control from his place. The upper plate can also be lifted by the hand-wheel at the side. Normally there is a space of 4 mm. between the 2 plates of the condenser, but when the upper plate is lifted, the space is 50 mm. When lengths of heavier proofed material have to be measured, the 4 mm. space allowed for general purposes can be suitably adjusted.

A drop-slide recorder, shown in Figure 2, produces dots at intervals of 3.5 seconds so that when the fabric is moving at a speed of 20 m. a minute, a dot is made for every meter of length. The Idometer can be used both with direct and with alternating current.



Kautschuk

Fig. 1. Sectional View of the Idometer

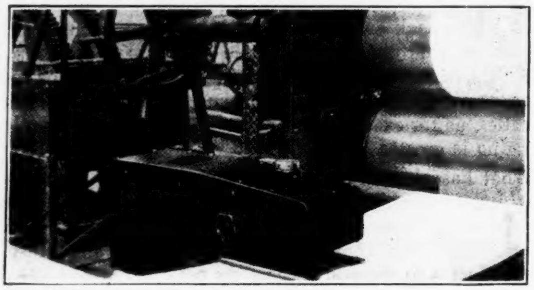


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Fig. 2. The Idometer Recording Thickness of Calendered Fabric

Testing pH in Latex[1]

Means for Scientific Control in Processing Liquid Rubber

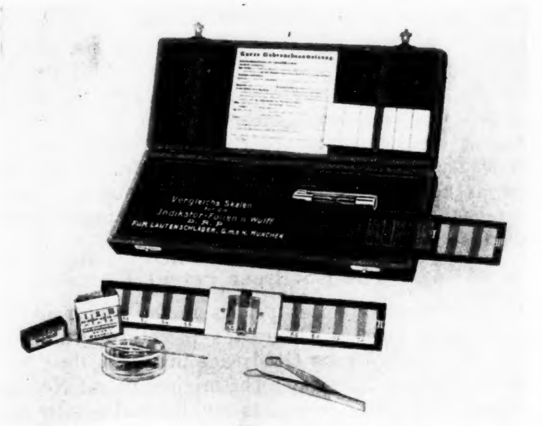


Fig. 1. Latex pH Tester

IT IS important to know the chemical activity of latex when preparing it for manufacturing operations such as the dipping and the electro-deposition processes. This determination may be made with a device which by color gradations shows the intensity of acid or alkaline chemical reactivity present in a solution.

The designation of this intensity is known as the pH value of the material. In this expression p stands for power or intensity, and H for positively charged dissociated hydrogen. The scale grades logarithmically from 1 at the acid end to 14 at the alkaline end. The middle point, pH7, is the neutral or dividing line and is the pH value of pure water.

Values on the pH scale can be determined electrically or by means of a standard color scale. The latter method, applied as described below, is generally favored for use with latex or other liquids whose opacity obscures color reactions.

Importance of Control

Control of pH value is highly important industrially. Appreciation of its bearing in rubber manufacturing is due to the introduction of latex and rubber dispersions in that industry. The pH tester described below has met with general favor in laboratories where latex control is a part of the routine because of its accuracy and convenience.

The apparatus and its container are pictured in Figure 1. This equipment consists of a small glass trough for holding the test material. Glass stirring rods and a pair of forceps provide means for handling the test strips without contamination. Three sets of impregnated nitrocellulose test strips are supplied and also a block of special blotting paper for removing excess liquid from the test strips. Three glass slides, 9½ by 1½ inches each, hold a set of permanent standards for one indicator. The standards consist of similar nitrocellulose strips colored to definite pH values. These, graded by 0.2, are marked on their respective strips. The strips have a clear space between them, and by means of a sliding holder the test strip may be matched and the pH value read at a glance. A white reflector is incorporated with the holder for even illumination. A one-minute sand glass serves to time the exposure of the test strip to the liquid.

Testing Latex

A test strip of the required range is placed in the latex in the glass dish and the sand glass turned up. After the strip has been brought into thorough contact for one minute with the latex by the glass rod it is removed with the forceps; the adhering rubber is blotted off, and the strip placed on the glass under the celluloid of the sliding holder. Its color is then matched with the corresponding standard series. If the color falls beyond the standard, the test is repeated, using an indicator strip of the next range. These simple testing operations, pictured in Figure 2, can be completed in 2 to 3 minutes and can be performed satisfactorily by plant operatives.

Need of Alkalinity Control

Fresh Hevea latex tests pH6. It is prepared for transportation in liquid form by the addition of ammonia. The amount necessary to preserve the latex is calculated on its serum content since that portion of the latex is subject to rapid decomposition resulting in coagulation.[2] Thus it becomes necessary to control the alkalinity of latex by pH tests during the processing applied to it in manufacturing, for the amount of ammonia present is subject to decrease by loss owing to natural evaporation.

Loss is further hastened by stirring the latex in the process of compounding or by the addition of materials having a tendency to neutralize the necessary alkalinity.

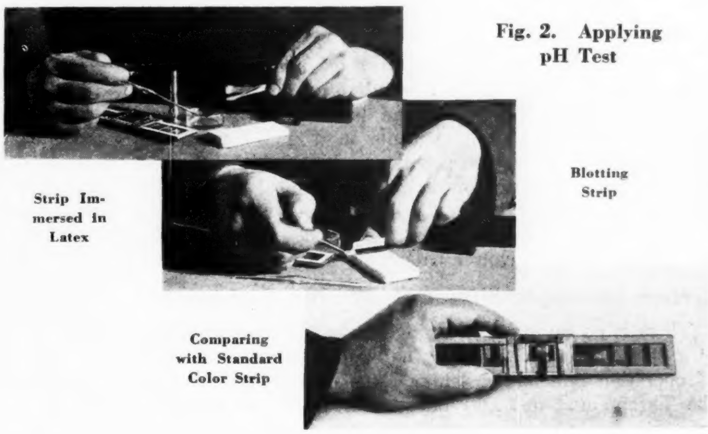


Fig. 2. Applying pH Test

Strip Immersed in Latex

Blotting Strip

Comparing with Standard Color Strip

[1] Data from Pfaltz & Bauer, Inc., 300 Pearl St., New York, N. Y.

[2] "Latex." E. A. Hauser. Translated by W. J. Kelly. p. 101, 1930.

Patentable Inventions

In the Rubber Industry

Joseph Rossman, Ph.D.

THE following is a continuation of the interesting and useful data on patenting inventions for the rubber industry, from our March 1, 1932, issue.

The Thropp and de Laski Patent

Patent No. 1,119,326 for a tire building machine issued to Thropp and de Laski was also held to be invalid as not involving invention. (Murray Rubber Co. v. de Laski & Thropp Circular Woven Tire Co., 21 Fed. Rep. [2d] 822). This patent covered a machine comprising a core on which tire may be built, means for placing tire fabric and bead cores thereon, and single mechanism adapted to move radially with respect to core and arcuately in plane substantially at right angles to plane of core for forming tire fabric on core both under and over bead cores. It was held by the court that although invention may be found in mechanism that supplants hand operation, particularly where mechanism dispenses with human element, where there has been no substantial change in mechanism or method of making product, and steps are the same and the succession from one step to the other is the same as those in manual art, the general rule of patent law is against "invention."

Mere Assemblages Are Not Patentable

In a recent case (ex parte Pade, 1928 C. D. 42) the Patent Office rejected an application for an apparatus for making inner tubes, which comprised separate machines for rolling tubes about a mandrel, wrapping lathes in which the tubes and mandrels were wrapped, heaters for vulcanizing the tubes, unwrapping machines for the cured tubes, and a conveyer for moving the mandrels in a circuit through these machines. This assembly of machines was held to be aggregative and therefore unpatentable since the separate machines perform independent and unrelated operations and without regard to the presence or the absence of the other.

It is well established in patent law that if an inventor has taken one feature from one patented device and another feature from another patented device and combines them and has produced no other results other than were produced by the original devices in their individual operation, then he has invented nothing.

A combination, however, may involve invention, even if every element is old, if a new result is accomplished or an old result reached by a new and better way. Every case involving the use of old elements in a new combination must be judged on its own peculiar facts; the ultimate question whether real invention or only mechanical skill is disclosed is question of fact, as is also the question whether a transfer of the device from one art to another and its adaptation to use therein involves patentable invention.

Mere Change in Size or Degree Not Patentable

There is no invention in changing the size and proportion of a device or machine so long as the construction and mode of operation remain the same. Thus in the case involving the Thropp and de Laski patent No. 1,119,326 previously discussed, the court found no invention in using larger spinning rolls for building tires. It is a settled principle of law that a mere carrying forward of an original patented conception involving only change of form, proportions, or degree, or the substitution of equivalents doing the same thing as the original invention, by substantially the same means, is not such an invention as will sustain a patent even though the changes of the kind may produce better results than prior inventions.

The Goodyear Patent

One of the most famous patents in the rubber industry and the most basic is Goodyear's patent for vulcanizing rubber. If it were not for Goodyear's invention, there would be no rubber industry today. The original patent No. 3,633 was granted in 1844. Strange to say, the real novelty of his invention was not claimed until the patent was reissued as No. 1,085 in 1860. On account of its historic interest we are reproducing the entire specification here.

UNITED STATES PATENT OFFICE

CHARLES GOODYEAR, OF NEW HAVEN, CONNECTICUT, EXECUTOR OF CHAS. GOODYEAR, DECEASED

IMPROVEMENT IN THE ART OF PREPARING CAOUTCHOUC

Specification forming part of Letters Patent No. 3,633, dated June 15, 1844; extended seven years; Reissue No. 156, dated December 25, 1849; Reissue No. 1,085, dated November 20, 1860.

DIVISION B.

To all whom it may concern:

Be it known that CHARLES GOODYEAR, late of the city of New Haven, in the State of Connecticut, did invent a certain new and useful Improvement in the Manner of Preparing Fabrics of Caoutchouc or India-Rubber, not known or used by others before his invention or discovery; and I do hereby declare that the following is a clear and exact description of the principle or character which distinguishes it from all other things known before.

The object of this invention is the production of the new manufacture, substance, or product known as "vulcanized india-rubber," (which is also the invention of said CHARLES GOODYEAR, and the subject of another patent bearing even date herewith,) and its peculiarity is in the art or process by which that manufacture or substance is produced. That art or process is conducted as follows:

Native caoutchouc or india-rubber is combined with sulphur, which may be done in various ways well known to the trade before the date of this invention, the most common of which is either by grinding the dry rubber and sulphur together in a machine with heated cylinders well known for that purpose, until the mixture is reduced to a plastic state, or by dissolving the caoutchouc or india-rubber in its known solvents, the one most commonly used being camphene or spirits of turpentine, and adding to the solution the sulphur in a powdered state. The proportions of the gum and sulphur which are found good in practice are twenty-five parts of india-rubber and five parts of sulphur, by weight, although vulcanization will be produced by using sulphur in various proportions considerably less or more than these. To this mixture other ingredients may be added, among which white lead is one of the best, and which, when combined with the rubber and sulphur in the proportion of seven parts, by weight, materially facilitates the process.

The mixture of india-rubber with sulphur and with other materials was well known before the date of this invention; but no result of any great value was thereby produced until CHARLES GOODYEAR discovered his new art or process, by which an entire change is effected in the properties and qualities of the mixture of india-rubber and sulphur, rendering the substance or material highly and permanently elastic under all conditions of its use, and insensible to heat and cold, and in some measure to the destructive effects of many of the essential oils and acids.

This art or process consists in subjecting caoutchouc or india-rubber, when combined with or in the presence of sulphur, to the action of a high degree of heat, for the purpose of changing or altering its qualities and properties and producing the new substance called "vulcanized india-rubber;" and it may be carried on in a variety of ways, the effect being due to the action of heat, without regard to the particular manner of its application. One of the methods is to place the composition of rubber and sulphur in an oven, and then to heat it up gradually until it attains the temperature necessary to produce the change required, which will be, say, from 212° to 350° Fahrenheit, according to the quantity of sulphur, the size of the mass to be operated upon, the degrees of temperature applied, and the presence of other ingredients in the composition. When the mixture is made in proportions of twenty-five parts of gum, five parts of sulphur, and seven parts of white lead, the temperature of 270° will be usually found the best, and the duration of the process will vary, according to the thicknesses of the mass, from two to six hours, the thinner mass requiring the least time. The same effect may also be produced by using heated cylinders and passing the material in sheets slowly over their surfaces, and in various other ways or methods, which the convenience of the operator may suggest. The heat may be communicated from the place of combustion to the place where the rubber is to be operated on, the only object being to subject the material to the influence of heat for a sufficient time to produce the desired result.

In subjecting the india-rubber to heat, for the purposes described, sulphur may be used or incorporated with or applied to the caoutchouc in a variety of ways, either in a gaseous, liquid, or solid form; but its presence in some form at some time during the application of the heat is essential to the production of the new manufacture which CHARLES GOODYEAR invented, although it is found that this effect will be produced by the addition of the very small quantities of sulphur. In practice, however, for most purposes the proportions mentioned in this description will be found sufficiently accurate for good results.

Before the plastic india-rubber (prepared as before mentioned) is subjected to the above-described process it may be molded or formed into any desired shape, and in that shape operated upon; and other materials—such as cotton, silk, wool, or leather—may be incorporated or combined with the india-rubber and sulphur, thereby modifying the strength, elasticity, or other qualities of the new manufacture for particular purposes, as it is found that the new substance or product will be produced whenever the essential elements of rubber, sulphur, and heat are used, whether such other materials are incorporated or not.

What is claimed as the invention of CHARLES GOODYEAR, deceased, is—

Subjecting caoutchouc or india-rubber or other vulcanizable gums mixed with or in the presence of sulphur (whether with or without other ingredients) to the action of heat, for the purpose of affecting its qualities or properties, as described.

CHAS. GOODYEAR.

In presence of—
EDW. N. DICKERSON,
JAMES A. DORR.

Goodyear's Patent Suits

Goodyear spent a fortune in litigating his patent rights. Pirates sprung up on all sides who tried to rob him of his invention. In his attempts to commercialize his vulcanizing process he was reduced to poverty and even imprisoned for his debts. After undergoing terrible hardships and successfully perfecting his process, infringers sought to prove, without success, that he was not the original inventor.

As the Supreme Court said many years later in a case involving a solid rubber tire: "Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having had any."

There are 32 suits brought by Charles Goodyear reported in Volume 10 of Federal Cases. In the suit of Goodyear v. Day, Fed. Case 5,569, Daniel Webster was one of the attorneys for Goodyear. In defending the validity of the patent Daniel Webster said:

"There is not a single question of fact in the case we have said, on which the court can feel the least doubt. We assert that Goodyear is the first man upon whose mind the idea ever flashed, or to whose intelligence the fact ever was disclosed, that by carrying heat to a certain height it would cease to render plastic the India rubber, and begin to harden and metallize it. If there is a man in the world who found out that fact before Goodyear who is he? Where is he? On what continent does he live? Who has heard of him? What books treat of him? What man among all the men on earth has seen him, known him, or named him? Yet it is certain that this discovery has been made. It is certain that it exists. It is certain that it is now a matter of common knowledge all over the civilized world. It is certain that 10 or 12 years ago it was not knowledge. It is certain that this curious result has grown into knowledge by somebody's discovery and invention. And who is that somebody? If Goodyear did not make the discovery, who did make it? Who did make it? If the other side had endeavored to prove that some one other than Mr. Goodyear had made this discovery, that would have been fair. But they do not meet Goodyear's claim by setting up a distinct claim of anybody else. They attempt to prove that Goodyear was not the inventor, by little shreds and patches of testimony. Here a little bit of sulphur and there a little parcel of lead; here a little degree of heat, a little hotter than would warm a man's hands, and in which a man could live for 10 minutes or a quarter of an hour; and yet they never came to the point. There are birds which fly in the air, seldom lighting but often hovering. Now this is a question not to be hovered over, not to be brooded over, and not to be dealt with as an infinitesimal quantity of small things. It is a case calling for a manly admission and a manly defense. I ask again, if there is anybody else than Goodyear who made this invention, who is he? Is the discovery so plain that it might have come about by accident? It is likely to work important changes in the arts everywhere. It introduces quite a new material into the manufacture of the arts, that material being nothing less than elastic metal. It is hard like metal, and as elastic as pure original gum elastic. It is as great and momentous a phenomenon occurring to men in the progress of their knowledge as it would be for a man to show that iron and gold could remain iron and gold and yet become elastic like India rubber. It would be just such another result. Now, this fact cannot be denied; it cannot be secreted; it cannot be kept out of sight; somebody has made this invention. That is certain. Who is he? There is not in the world a human being that can stand up and say that it is his invention, except the man who is sitting at that table. The learned counsel may prove that A. made a part, and B. made a part, and C. made a part, but A., B., C., and D., and all the rest of the alphabet disclaim this as their invention. I say, therefore, at this hour in which I have the honour to be speaking to this court, that there is not a man on the footstool who pretends this is his invention but one—not a man. Is that not enough? The invention exists. Everybody knows and understands it, and everybody connected in former times with the manufacture of India rubber has been astonished and surprised at it. There have been many respectable witnesses in this case, and the best and most intelligent of them say, after having been engaged in attempts in this manufacture for years and years, losing their time and fortunes, they never heard of or imagined any such thing, as the

vulcanization of rubber until Goodyear's invention was made."

In regard to the contention of the defendant that Goodyear was not the first inventor and that he had borrowed from others, the court said: "The testimony shows that many persons had made experiments—that they had used sulphur, lead, and heat, before Goodyear's patents, and probably before his discovery. But to what purpose? Their experiments ended in discovering nothing except, perhaps, that they had ruined themselves. The great difference between them and Goodyear is, that he persisted in his experiments, and finally succeeded in perfecting a valuable discovery, and they failed. It is usually the case, when any valuable discovery is made, or any new machine of great utility has been invented, that the attention of the public has been turned to that subject previously; and that many persons have been making researches and experiments. Philosophers and mechanicians may have, in some measure, anticipated, in their speculation, the possibility or probability of such discovery or invention; many experiments may have been unsuccessfully tried, coming very near, yet falling short of the desired result. They have produced nothing beneficial. The invention, when perfected, may truly be said to be the culminating point of many experiments, not only by the inventor, but by many others. He may have profited indirectly by the unsuccessful experiments and failures of others; but it gives them no right to claim a share of the honour or the profit of the successful inventor. It is when speculation has been reduced to practice, when experiment has resulted in discovery, and when that discovery has been perfected by patient and continued experiments—when some new compound, art, manufacture, or machine, has been thus produced, which is useful to the public, that the party making it becomes a public benefactor, and entitled to a patent.

"And yet when genius and patient perseverance have at length succeeded, in spite of sneers and scoffs, in perfecting some valuable invention or discovery, how seldom is it followed by reward? Envy robs him of the honour, while speculators, swindlers, and pirates rob him of the profits. Every unsuccessful experimenter who did, or did not, come very near making the discovery, now claims it. Every one who can invent an improvement, or vary its form, claims a right to pirate the original discovery. We need not summon Morse, or Blanchard, or Woodworth, to prove that this is the usual history of every great discovery or invention.

"The present case adds another chapter to this long and uniform history. But notwithstanding the indomitable energy and perseverance with which this attempt to invalidate the patent has been pursued, the volumes of testimony with which it is oppressed and the great ability with which it has been canvassed in the argument, we are of opinion that the defendant has signally failed in the attempt to show that himself or any other person discovered and perfected the process of manufacturing vulcanized India rubber before Goodyear. We shall give therefore our decree of perpetual injunction."

(*To be continued.*)

Lastex Yarn and Fabrics

A New Latex Product for the Textile Industry

THE descriptive term "Lastex" is applied to a new type of elastic yarn used in the construction of knit and woven elastic fabrics. This new yarn represents the first successful attempt to produce a fine elastic yarn which can be knitted or woven on any machine or loom for the production of any known fabric and has made possible for the first time the manufacture of knitted fabrics that will stretch both ways.

Textile manufacturers in many lines are developing the use of Lastex in new and improved products. The scope of its application includes knitted garments for personal use of men, women, and children, for surgical and athletic goods, narrow fabrics, and woven fabrics such as dress goods, draperies, upholsteries, corset fabrics, blankets, bedspreads, rugs, and automobile fabrics. Many kinds of Lastex goods are now in production, particularly as foundation garments, corsets, etc., for feminine wear that are glove fitting, light, and admit freedom of body movement.

Lastex Yarn

The foundation of Lastex yarns is a round cross-section elastic core of rubber thread produced by extruding compounded rubber latex through a special nozzle into a coagulating liquid.[1] The rubber thread thus formed is conveyed through a succession of chemical solutions for hardening, washing, etc.; thence on to a drying conveyer where water absorbed in the washing bath is eliminated. From the drying conveyer the thread passes into troughs containing alcoholic vulcanizing solutions. Further treatment in various baths eliminates absorbed alcohol, hardens, completes the vulcanization, and delivers the washed thread ready for manufacture into yarns.

Completing the Yarn

Lastex yarns are produced by covering the rubber core[2] in special cyclic winding machines with right and left windings of cotton, silk, rayon, or wool as the case may be. The rubber filament is fed through the winding device under the necessary tension to produce finished yarn of predetermined stretching capacity.

A range of 7 sizes of Lastex yarn is produced. Each size is of definite construction beginning with number 1 which has a core of 2 rubber threads to number 7, the finest size made. The latter contains a single rubber filament having a diameter 1/125-inch. An idea of this remarkable development of Lastex yarns may be formed from the fact that one pound of the finest size measures 12,000 yards in length when relaxed and will extend to 20,000 yards in length at full tension.

Besides being adapted for use in knitting machines and looms for weaving all varieties of fabrics, this yarn is adapted for use in seaming goods by sewing machines. In this way elastic fabric garments for athletic and other purposes may be produced with elastic seams. This feature is quite as essential as elasticity of the fabric of the garment itself.

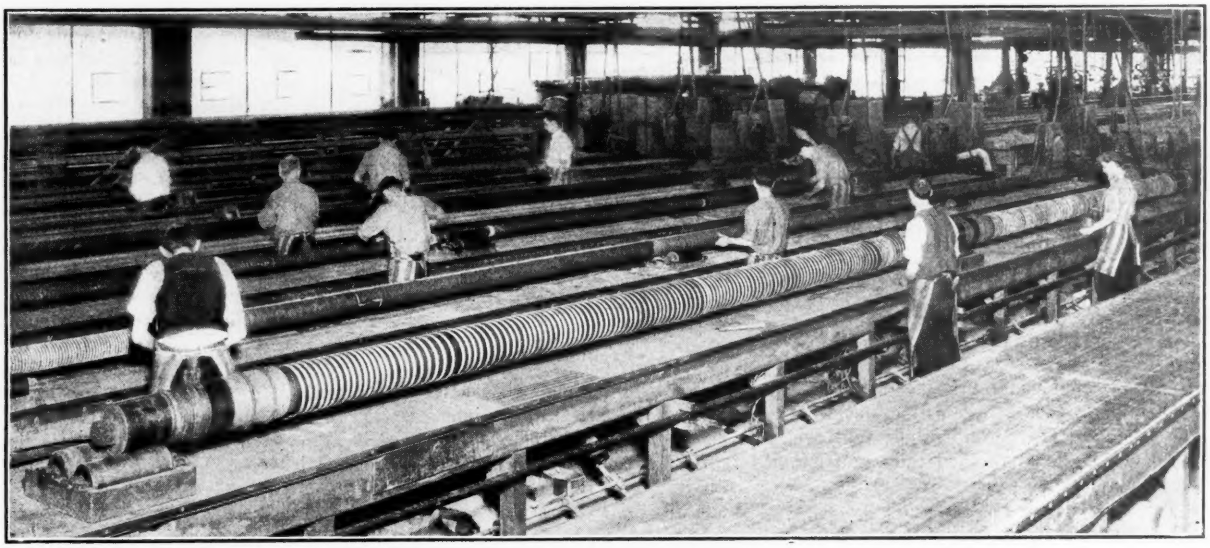
[1] U. S. Patent No. 1,545,257, July 7, 1925.

[2] U. S. Patent No. 1,822,847, Sept. 8, 1931.

Suction Hose

Rough and Smooth Bore Types and Specialties – Government Specifications

Webster Norris



Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc.

Fig. 1. Suction Hose Making

PUMPING of water and many other liquids required in engineering construction and industry is dependent on rubber suction hose of one of its 2 general types: namely, rough bore or smooth bore. These terms indicate whether the wire spiral support is exposed in the waterway or whether it is embedded in the hose wall construction.

Both types of suction hose are made in sizes ranging by ½-inch intervals from 1 to 12 inches inside diameter, and usually to specified lengths, not exceeding 50 feet up to 4 inches diameter or 15 feet for hose 6 inches or more in diameter. Choice between rough and smooth bore hose constructions depends on the nature of the liquids to be pumped. Rough bore suction, otherwise known as wire lined, has little flexibility because it is built on flat wire. It is suited for general suction purposes on pumps handling oil, and for wrecking, mining and similar work where free moving noncorrosive liquids are handled. Smooth bore suction is used for both heavy and light service pumping of thick liquids, acids, and other corrosive fluids.

The general operations of suction hose manufacture are shown in Figure 1, which represents a modern hose making room showing large-size typical suction hose in various stages of construction.

Rough Bore Types

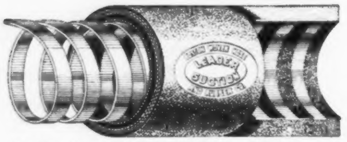
Rough bore suction hose for general use, pictured in Figure 2, is built upon a flat steel wire. Construction begins by spiraling the wire lining directly on the hose mandrel. The metal is usually galvanized, round edge, flat steel wire. Uniform intervals between the coils are maintained by employing a coil of the same wire as a guide advancing along the pole with the winding of the spiral. The spiral is held to a fixed length at each end of the mandrel by being wound by several turns of frictioned duck serving as strapping.

Immediately over the wire a single ply of frictioned duck, skim coated one side, is laid with the skim side next to the wire. The duck being cut bias is readily forced down to the hose pole and snugly fitted in the intervals between coils. Thus embedded in rubber coated duck the spiral serves as a support and waterway for the hose. The remainder of the construction consists of several plies of frictioned duck forming a wall varying in thickness with the size of the hose and the service intended. The hose structure is completed by a cover ply of tough rubber composition. The wrapped hose previous to vulcanization receives a winding of cordage to consolidate the construction. Finished rough bore hose, therefore, shows distinct corrugation on the outside.

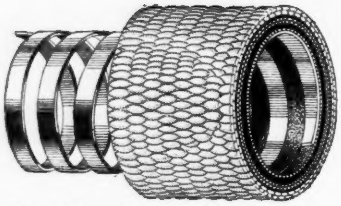
Oil and Agricultural Suction

Oil and agricultural suction hose are instances in which the typical rough bore construction is modified because of special conditions of service. In the case of oil suction the construction is designed for either suction or discharge. Such a hose is used for transferring oil from tankers or barges to dock storage or the reverse. Its rough bore construction is reenforced against internal pressure by a spiral wire binding applied over the main duck plies and covered with one duck ply immediately under the rubber cover. Additional reenforcement is possible by winding the exterior of the hose with wire armor.

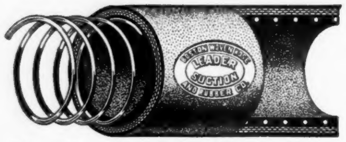
Lightness, flexibility, and freedom from kinking are essential features of agricultural suction hose to insure satisfac-



Boston Woven Hose & Rubber Co.
Fig. 2. Rough Bore Suction



Boston Woven Hose & Rubber Co.
Fig. 3. Agricultural Suction



Boston Woven Hose & Rubber Co.
Fig. 4. Smooth Bore Suction

tion in thresher pump service; consequently the construction required is light throughout. Ordinary agricultural suction is made with plain rubber cover. The higher grade hose has in addition the protection of a heavy woven jacket of cotton as represented in Figure 3.

Manhattan Rubber Mfg. Division
Fig. 5. Corrugated Tender Hose

Manhattan Rubber Mfg. Division
Fig. 6. Vacuum Hose

Smooth Bore Types

Smooth bore suction is designed for pumping thick liquids, and water containing sand or grit, acid or other materials that will injure a metallic lining. The usual smooth bore type, illustrated in Figure 4, is constructed on the following plan. (1) First rubber tube next to mandrel. (2) Single ply of frictioned fabric. (3) Round wire spiraled over a fabric ply. (4) Rubber filling spiraled to fill between the coils of wire. (5) Second rubber tube over wire and filling. (6) Duck wall of specified plies of frictioned fabric. (7) Outside rubber covering.

The tube has a rubber lining made of a single ply of calendered sheet. Over this is rolled down a single ply of duck upon which a spiral coil of round wire is spun as the mandrel resting in roller supports is turned by a hand crank. The ends of the spiral are bound with frictioned duck strapping as in rough bore hose. The interval between coils is filled with strip rubber to level up the construction before covering the wire with a ply of calendered tube stock. The object is fully to embed the wire to protect it against contact with the liquids passing through the hose. The principal lines of service in which smooth bore suction is used are for fire engines, diaphragm pumps, and sand, oil, and acid pumping.

The smooth bore constructions of much importance are tender hose and vacuum hose. Tender hose is smooth bore of heavy construction. It has smooth straight ends for attachment of nipples and is deeply corrugated to provide the flexibility required by its location and movement in service. A complete section of this hose is shown in Figure 5.

Vacuum hose used in connection with vacuum cleaning machinery is built in 2 weights. The heavier construction, pictured in Figure 6, is for service machines or public buildings. In this grade the wire coils are well embedded in a layer of rubber intermediate between the inner and the outer single duck plies. The grade for household use is generally finished with a braided colored cover and is lighter in construction.

Hard Rubber Suction

A smooth bore suction hose of minor importance for commercial uses is made in small sizes only. Its support against collapsing under suction depends upon semi-hard rubber used in place of the wire in other varieties of suction.

Government smooth bore suction structural details and physical requirements specified for United States Government smooth bore suction hose are shown in Table I. This is quoted from Federal Specifications ZZ-H-561 and prescribes high grade suction construction.

TABLE I—UNITED STATES SMOOTH BORE SUCTION CONSTRUCTION

Physical Requirements

Size ... inches	1½	2	2½	3	4	4½	6	8	10	12
Internal diameter ... inches	1½	2	2½	3	4	4½	6	8	10	12
Outside diameter:										
Soft ends for couplings, minimum ... inches	2½	3	3 9/16	4 3/32	5¼	5¾	7½	9⅝	11⅞	14 1/16
Soft ends for nipples, minimum ... inches	....	....	....	....	5⅝	6⅛	8	10 3/16	12 9/16	14 11/16
Tolerance (plus or minus), inside diameter ... inch	1/32	1/32	3/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32
Thickness:										
Tube, minimum ... inch	1/16	1/16	1/16	1/16	1/16	1/16	3/32	3/32	3/32	3/32
Cover, minimum ... inch	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Layer, minimum ... inch	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Filler, minimum ... inch	⅛	⅛	3/32	3/32	3/16	3/16	¼	3/32	⅜	⅜
Washers, minimum ... inch	⅛	¼	¼	¼	¼	¼	¼	¼	¼	¼
Size of wire, minimum ... inch	0.120	0.120	0.148	0.148	0.177	0.177	0.244	0.283	0.362	0.362
Spacing, maximum ... inch	½	½	⅝	⅝	⅝	⅝	⅝	⅝	⅝	⅝
Plies of duck,[1] minimum ...	4	4	4	4	5	5	6	7	8	10
Weight of duck, minimum ... oz. per sq. yd.	14.4	14.4	14.4	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Hydrostatic test pressure,[2] minimum ... lbs. per sq. in.	100	100	100	100	100	100	50	25	25	25
Friction between plies,[3] and between plies and rubber parts, minimum ... pounds	15	15	15	15	15	15	15	15	15	15
Tensile strength,[4] tube and layer, minimum ... lbs. per sq. in.	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Cover, minimum ... lbs. per sq. in.	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
Ultimate elongation, tube, layer, and cover, minimum ... inches	2-11	2-11	2-11	2-11	2-11	2-11	2-11	2-11	2-11	2-11
Set, tube, layer, and cover, stretch 10 minutes ... inches	2-10	2-10	2-10	2-10	2-10	2-10	2-10	2-10	2-10	2-10
Set after 10 minutes rest, maximum ... per cent	25	25	25	25	25	25	25	25	25	25

[1]The hose in all sizes is to be made with 1 ply of duck over the tube.

[2]Hose complete with couplings (or nipples) shall withstand the pressure indicated without leakage or any indication of weakness.

[3]The rate of separation shall not be greater than 1 inch per minute under the specified load when tested on a mandrel.

[4]The tensile strength of tube, layer, and cover, after being subjected to an accelerated aging test of 96 hours in air at 158±2° F., shall show a decrease from the tensile strength determined before heating of not over 25%, unless the thickness of test pieces is necessarily less than 0.05 inch, in which case a maximum decrease of 35% will be permitted.

Rubber Printing Plates[1]

Molded Rubber Letter-Press, Line Cut and Halftone Plates for Commercial Printing

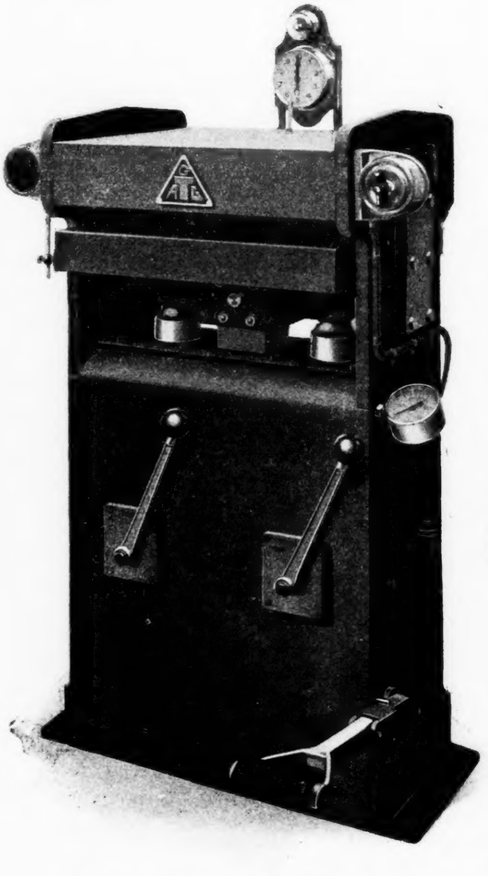


Fig. 1. Electric Vulcanizing Press

THE facility with which the common hand stamp can be produced, its cheapness, and its adaptability to printing on uneven surfaces has been extended to power-press printing by the development of a new system of plate making. The process, operated with special materials and equipment, gives exact reproductions of the original engraving, electrotype, type matter, or whatever is being molded.

Molding

A special quality stock suitable for retaining fine impressions is used for making the matrix from which any number of printing plates may be molded. The calendered sheet of mold stock is impressed in an electric hydraulic vulcanizing press of the style pictured in Figure 1. This press is well adapted to the exact work required in printing plate mold making both as to the mold and the final plate, either of which can be vulcanized in a few minutes.

The press consists of 2 electrically heated platens mounted on a heavy cast-iron pedestal at a convenient height. The upper platen is supported in fixed position by vertical steel columns of large diameter, which serve also as guides for the movable bottom platen raised by a foot power operated hydraulic pump using oil. The treadle of the pump is shown at the bottom of Figure 1. The bottom platen is lowered by means of a valve which releases the oil from the hydraulic cylinder. Pressures up to 22,000 and 45,000 pounds are easily obtainable on the different sizes of such presses.

Electric heating provides an even temperature throughout the entire surface of both platens. In this respect the press pictured has been found superior to presses heated by either steam or gas. The heating elements are wholly enclosed and protected from contact with the air. They are not in any way affected by the pressure used in molding and vulcanizing. This electric vulcanizer is clean; no fumes or vapor emanate from it, and there is no installation cost whatever. It is necessary only to plug into a power circuit of from 15 to 25 amperes, and the press is ready to operate as it is a complete unit in itself.

The vulcanizing press is equipped with a thermostatic control which holds the temperature constant within a few degrees at all times.

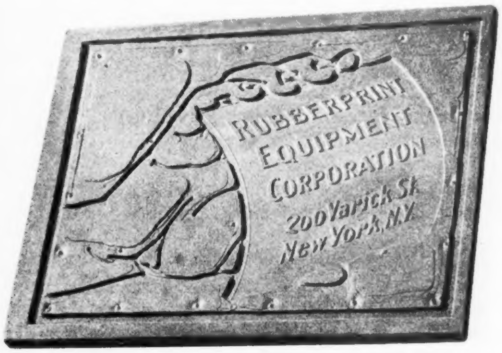


Fig. 2. Rubber Mold for Rubber Printing Plate

Fig. 3. Rubber Printing Plate Mounted

Fig. 4. Electric Grinder

[1]Data and illustrations from Rubberprint Equipment Corp. 200 Varick St., New York, N. Y.

No variation of temperature occurs as in the case of steam vulcanizing pressures owing to variations in pressure or the presence of water of condensation. The thermostat turns the electric current on and off without attention from the operator, thus eliminating under- or over-curing.

In addition to the thermostat the press is equipped with a thermometer and a pressure gage. The latter indicates the exact pressure being applied on the platens. The exact thickness of the mold or printing plate being made is shown by a thickness gage attached to the press. Besides this gage another, or stop gage is provided, which prevents the press platens from being forced too close together. Thus the correct thickness for mold and printing plate is insured. Timing of the cure is controlled by a special alarm clock, which is set by the operator to indicate the end of the curing period by ringing a bell.

Electric Grinder

Preparatory to making a rubber printing plate mold such as that shown in Figure 2, it is necessary to insure that the back of the engraving or electrotype to be molded is absolutely parallel with its printing surface. The same condition applies to the mounted rubber printing plate illustrated in Figure 3. The accuracy thus required is secured by the electric grinder pictured in Figure 4. The procedure is to paste a piece of cardboard on the back of the electrotype to be molded or on the back of the mounted rubber printing plate block. Thus prepared, the block is placed face downward on the table of the electric grinder, which removes any high spots and insures the production of an accurate mold in the one case and a true printing surface in the other. The use of the grinder produces a rubber printing plate of perfectly uniform thickness and practically eliminates make-ready on the press.

By the method described it is a simple matter to make as many duplicates as required, mounted either for rotary or flat bed presses. Rubber printing requires substantially less ink than ordinary letter press, lithography, or rotogravure; while make-ready is negligible or wholly unnecessary. Rubber plates take ink well and produce clean and sharp impressions on any kind of surface.

Radio Directional Signaling

THE use of the theodolite to follow a source of light carried into the upper air by a small balloon, heretofore serving as a means for direction finding, has now been displaced. In keeping with the advances of aviation in blind flying, night flying, and forced flights in inclement weather, the Signal Corps of the United States Army is now able to give data on the upper air regardless of weather conditions. This aid to aviation is rendered possible by the invention of a super midget radio transmitter and suitable directional range finder. The flight of the midget transmitter is effected by means of a group of rubber balloons, the operating details of which are as follows:

When actual balloon tests are made, the transmitter is first adjusted on a test stand where the receiver is attuned to the tone-modulated, clear musical note of its signal. After the balloon has been released and has traveled 2 or 3 miles the signal becomes weak; then a heterodyne reception brought into play results in giving the signal a readily distinguished hissing sound. The directional finding receivers follow the transmitting balloon radio easily and serve the purpose extremely well, being correct to less than half a degree. By properly inflating the balloons and knowing their ascensional rate, the elevation is easily determined. Despite all balloon tracking tests no transmitter has failed to operate successfully, and upper air observation in cloudy, foggy, and inclement weather has become a reality. Flying, gunnery, and forecasting in general have benefited by this advance.

THE AMERICAN RUBBER INDUSTRY MAY HAVE HAD MUCH else to contend with in the past few years, but it has found much compensation in the fact that the cost of basic materials has been the least of its handicaps. In 1926, 925,-878,000 pounds of crude rubber were imported, which cost $505,818,000; in 1931, 1,121,003,000 pounds, the cost being but $73,803,000 only about 1/7 of that of 5 years before. It is even cheaper now.

Rubber Backed Carpet

RUBBER backing as an integral part of the construction of carpeting and rugs is applied in various ways. One such construction previously noted in this journal[1] is effected by a patented method.[2] The object is to provide a pile fabric having the appearance of a broad-loom carpet woven the maximum width of the covered area, which is, in fact, built up from narrower widths so constructed and connected as to provide non-raveling concealed joints. The rubber backing effects the non-skid feature.

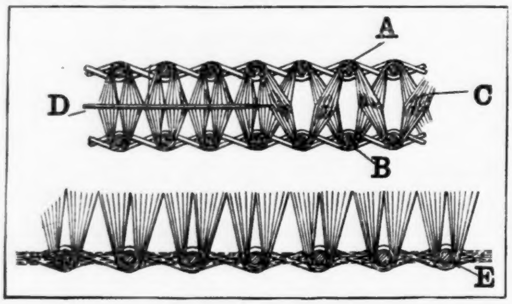


Fig. 1. Rubber Backed Pile Carpet

The construction proceeds as follows. A double pile fabric woven upon a usual type of plush loom as shown in the upper section of Figure 1 has backings *A* and *B* united by pile warps *C* which are split by a cutter *D* separating the material into 2 individual pile fabrics. The loosely woven pile warps of the separated fabric, represented in the lower section of Figure 1, are anchored to the backing by a coating *E* which prevents shedding and raveling of cut edges.

The anchoring coat material consists of an aqueous dispersion of rubber containing a vulcanizer and an accelerator. This coating is coagulated either by evaporation at normal temperatures or by heating sufficiently to effect vulcanization and coagulation. Laps of carpet of this construction are held against displacement on the floor by an adhesive strip applied along the backing, covering the joint and rendering it invisible and non-spreading in service.

[1] "Latex Treated Carpet," INDIA RUBBER WORLD, May 1, 1931, p. 60.

[2] U. S. Patent No. 1,842,746, Jan. 26, 1932.

Impregnating with Latex[1]

Conditions – Technology of Impregnating – Impregnating by Spreading

ALTHOUGH the price of latex is still very high as compared with that of crude rubber, the interest in the direct application of natural latex is constantly increasing because of the advantages connected therewith.

The widest use for latex has been in the field of impregnating fabrics. This comprises the production of fabric plies for driving and conveyer belts, hose, floor coverings, packing, and especially the impregnation of cord fabrics for the tire industry; in addition the production of waterproof materials for clothing, fabrics for collapsible boats, diving suits, and surgical purposes.

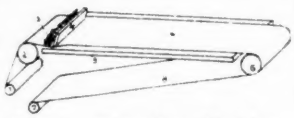


Fig. 1. Spreading Machine

Despite its increasing use latex cannot be so intimately combined with cotton fabrics as rubber benzine solutions and cotton fabrics, for instance. The impregnation of textile fabrics with a liquid is based on the adsorption of the impregnating liquid by the fine capillaries of the fabric fiber. In general animal fibers, wool and silk, take up impregnating liquids more easily than vegetable fibers such as cotton, linen, and jute. In order thoroughly to impregnate cotton fabric or thread with latex, it must be completely penetrated by the latex fluid. But the fiber must be defatted before latex will penetrate it. The wax-like substance in the cotton fibers repels the latex in the same way a greasy surface behaves toward water. Thus the surface film of the cotton fiber repels the latex, and results in poor adhesion between fabric and latex. Also the size of the latex particle in comparison with the fine capillaries of the fabric fibers prevent thorough impregnation with latex.[2]

That the impregnation of fabrics with latex on spreaders is not successful is shown by the ease with which the cured rubber layer can be stripped from the fabric. A more reliable union of cotton fabric with latex is attained by preliminary wetting which makes the fibers of the fabric more absorbent. However the process of impregnating is not simplified or cheapened in this way.

The technical development of impregnation with latex began with spreading latex by hand on fabric to render it waterproof, as the natives of South America practised it from time immemorable as described by travelers. Today the impregnation of the fabric is conducted according to various methods, the best known of which will be briefly mentioned.

Where spreading machines are available, they are still used for applying latex or latex concentrate. See Figure 1. The fabric to be impregnated is rolled off the reel 1, passes under the spreading knife 4, in front of which the rubber is laid on, and then after passing the drying plate 5, is rolled up on reel 7. Since the pressure of the spreading knife on the fabric can be adjusted, the amount of rubber to be applied can be regulated. In latex impregnation it is necessary to decrease the speed of the machine or to enlarge the drying equipment, for the water in the latex does not evaporate so rapidly as the benzine of a rubber solution. The use of a spreading machine, of course, is only a makeshift. Outputs of 15 m. of fabric per minute, as are attained with up-to-date impregnating machines, cannot be obtained with it. Impregnation, moreover, takes place on only one side. However a spreading machine is of advantage in manufacturing waterproof fabrics rubberized on one side with vulcanized latex, especially in the case of fine fabrics such as silk, which would be damaged by subsequent curing.

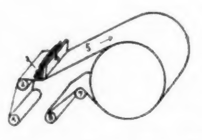


Fig. 2. Drum Spreading Machine

Impregnation by the drum-spreading machine shown in Figure 2 proofs only on one side; therefore the output is comparatively low. After passing the spreading knife or a small roller which rubs the latex into the fabric, the latter is dried by running over a steam heated drum of about 1.5 m. diameter. For impregnating weftless cord fabric the spreading drum is suitable only when 2 drums are provided and the application of the rubber takes place on both sides.

Figure 3 shows a diagram of a vertical impregnating machine. The fabric to be treated is led over guide rollers through a tank filled with latex. After leaving the container the fabric passes between 2 rubber covered squeezing rollers, that check the surplus latex, which flows back again into the tank. Spreading knives may also take the place of the squeezing rollers. Above the rollers are drying chambers vertically arranged so that these machines require only limited floor space. Both square woven and cord fabrics can be treated on these vertical impregnating machines. To make impregnated cord fabrics the cords are passed through a comb which alines them side by side. The web of material thus obtained passes through the impregnating bath, under uniform tension, then through the drip rollers and the drying apparatus. As a result of the stickiness of the covering latex layer, the closely arranged threads adhere to form a web of fabric. To prevent the sticking of the layers the impregnated cord fabric is rolled on the reel with a liner.

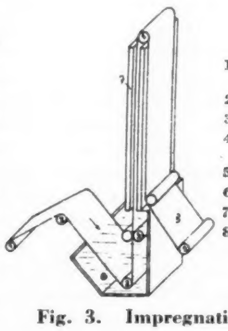


Fig. 3. Impregnating Machine

Impregnating machines, as shown in Figure 4, are also used for treating welftess cord fabrics. The drying ar-

[1]*Gummi-Ztg.*, 46. pp. 531 and 566 (1932).
[2]Compare E. A. Hauser, "Impragnierungen," *Kautschuk*, 7, p. 89 (1931).

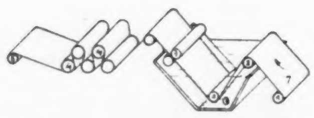


Fig. 4. Impregnating Machine

1. Winding-off roller
2. Guide roller
3. Drip rollers
4. Drying rollers
5. Taking-up roller
6. Latex tank
7. Fabric

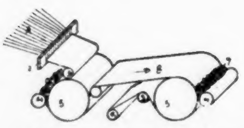


Fig. 5. Impregnating Cord on Both Sides

1. Cords
2. Collecting frame
3. Guide roller
4. Spreading roller
5. Drying drum
6. Taking-up roller
7. Latex
8. Cord fabric

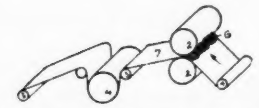


Fig. 6. Impregnation on the Calender

1. Winding-off roller
2. Calender rolls
3. Guide roller
4. Drying drum
5. Taking-up roller
6. Latex
7. Fabric

rangement consists of a series of horizontal steam heated drums over which the fabric runs after passing through the latex bath and the closely spaced drip-rollers. Here too the cord threads adhere to each other because of the latex impregnation.

Cord fabrics are also made on the machine shown in Figure 5. The individual cord threads are collected together by a reed and are held parallel by tension rollers. As the fabric passes around the slowly rotating heated drums, concentrated latex is applied at suitable positions, and by spreading rollers or knives the latex concentrate is spread on both sides of the cord at one time.

Impregnation with latex can also take place on a 2-roll calender and in the same way as practiced in the wet-friction process with a rubber compound prepared with solvent. Both rolls of the calender have almost the same surface speed during calendering. The impregnated fabric is dried on a heated drum after leaving the calender rolls. See Figure 6.

Semi-manufactured goods, particularly tire fabrics, are impregnated as well as covered with rubber on the calender. The life of an automobile tire depends on retarding the breaking down of the cotton fibers by friction; therefore care is exercised to cover thoroughly all threads with rubber. To this end the cords are first impregnated with rubber, a rubber benzine solution being used, and then frictioned on the calender with a paste-like rubber stock. Impregnation with latex is becoming more widespread; many advantages, especially the elimination of fire hazard and the possibility offered thereby of including the impregnation installations in the continuous operation process, favor the latex process and displace the rubber benzine solution.

A perfect impregnation of the cotton results only when impregnation is carried out with rubber benzine solution since the solvent benzine results in a thorough wetting of the cotton fiber and dissolves its fatty components. Logically speaking, impregnation with natural latex could therefore be omitted since it has no real value. Some factories actually friction their tire fabrics only on the calender, using a concentrated latex compound, without previously impregnating it and without experiencing any disadvantages.

The frictioning of a latex layer on the fabric by a calender may take place in various ways. The process shown in Figure 7 can be used only for weftless fabrics. The lengths of fabric built up of cord thread arranged side by side and beamed together under tension may also be impregnated, and are led over the 2 bottom rolls of a 4-roll calender, about which also passes a layer of latex compound so that the threads first lie under and then on the latex layer. The rolls, around which the threads are led, are so adjusted that rubber and thread receive no pressure during the passage. Thus a fabric coated on both sides with latex is obtained. This process is registered under German patent No. 362,096. However it is not to be assumed that the patent rights are still maintained today.

For proofing on 2 sides with latex both cord and filled fabrics, the 4-roll calender, shown in Figure 8 and the 3-roll calender in Figure 9 are used. To the latter are also attached spreading rolls of small diameter or spreading knives, adjustable by screw spindles.

There has been, of course, no lack of attempts to improve the adhesion between latex and fabric. For instance in a purely mechanical way good adhesion of the latex to the cotton fabric was attained when latex was rubbed into the fabric with hand brushes. The size of the latex particles does not seem to be a decisive factor in impregnation; otherwise a good adhesion could not have been arrived at by mere pretreatment of the cotton fabric, by wetting or boiling the fabrics with alkaline lyes.

When untreated cotton fabric is impregnated in a latex bath and if, while it is still wet, compressed air at 75 pounds per square inch is directed on the fabric through fine nozzles, then a good adhesion of the latex is obtained as well as a considerable resistance to separation of the individual plies of fabric after vulcanization.

In further tests impregnation in the latex bath was entirely omitted, and latex was sprayed on the fabric by several spray guns like those used for painting and varnishing. Figure 10 shows the experimental apparatus. The spreading knife had been removed from an old spreading machine, and in its place a nozzle holder was arranged to reciprocate across the machine so that the nozzles could spray a large surface. The nozzle holder, consisting of a steel pipe, at the same time served to provide the compressed air, the flow of which could be regulated by a valve.

Figure 11 shows the details of a spraying nozzle with the latex and compressed air connections. Latex is conveyed to the individual nozzles through rubber tubes from a tank arranged above the machine. Because of the uniform forward movement of the fabric and the constant lateral reciprocating movement of the nozzles a latex layer of uniform thickness is sprayed all over the surface.

As compared with the latex impregnating process, the impregnation by spraying shows good adhesion between latex and fabric. To determine the resistance to separation of

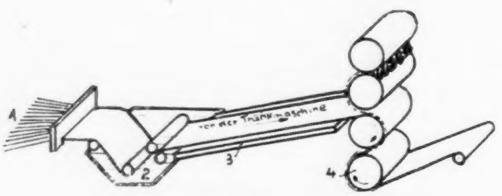


Fig. 7. Rubberizing Cords

1. Cord thread
2. Dipping installation
3. Drying platen
4. Calender rolls

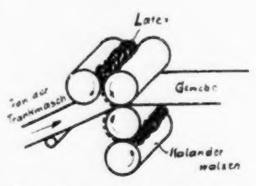


Fig. 8. Rubberizing on Both Sides

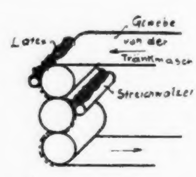


Fig. 9. Rubberizing on Both Sides

Arrow shows directions of fabric from dipping trough. Black masses represent latex. Narrow rolls are spreading rolls.

fabric impregnated with latex by spraying pistols, samples (4-ply) were vulcanized in a press and cut into strips 5 cm. wide. The plies were then stripped apart on a Schopper testing machine. Separation took place on the average with a load of 28 kg. Several samples impregnated with benzine rubber solution showed still greater resistance to separation on the average about 30 kg. with 5 cm. width. Other samples, taken from a fabric first impregnated with thin rubber benzine solution and then frictioned on the calender with dry rubber compound, could be loaded with 24-25 kg. before the individual layers separated. On the other hand sample strips of a fabric impregnated in latex bath without any preliminary treatment showed a resistance to ripping averaging only 16 kg. with 5 cm. width.

From the good results of the experiments which have been conducted for some time it follows that impregnation with latex by spraying will continue to stand the test and will lead to a more widespread use of the method, seeing that the process also has the advantage of being economical in the use of rubber. The tests were made with both concentrated and dilute latex; in both cases the dispersion through the spraying nozzles was equally good. No differences in the resistance to separation were observed.

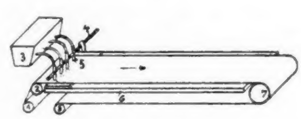


Fig. 10. Spray Rubberizing

1. Winding - off roller
2. Guide roller
3. Latex tank
4. Compressed air pipe
5. Spray nozzles
6. Drying platen
7. Conveying roller
8. Taking-up roller

In these tests it would have been interesting to have studied the amount of penetration of latex in the fibers. The writer however lacked the necessary scientific apparatus to undertake accurate observations himself. He had to be content with simple testing appliances and with the mere observation and testing of the adhesion. In any case it is established that good union of latex with cotton fabric can be obtained by the spraying process.

Anyone can convince himself of this good adhesion by a simple experiment, by spraying a piece of fabric with a small spray-pistol filled with latex and connected to a compressed air pipe, then vulcanizing the sample, and making the test for resistance to separation.

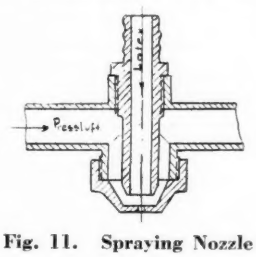


Fig. 11. Spraying Nozzle

Pressluft, indicated by horizontal arrow, is compressed air

The quality of the impregnation by spraying depends upon the tension of the compressed air used and the size and the location of the nozzle opening—the stream of latex need not strike the fabric vertically—on the consistency of the latex, the cleanliness of the nozzles, and the proper construction of the apparatus.

The latex to be used should be preserved with ammonia. Cleaning the spraying apparatus can easily be effected by blowing soft or distilled water through before or after beginning work; this water removes all traces of latex in the nozzles; while dilution with water easily makes dried out latex fit for use again. It was found advantageous to clean the fabric of dust, etc., by blowing compressed air through nozzles, before it passed the spraying apparatus.

Impregnation by spraying lends itself to filled fabrics as well as to weftless cord fabric. Nor is there any difficulty in thoroughly impregnating cotton threads with latex alone with the help of compressed air. Whether tests with latex in this direction have already been made elsewhere could not be discovered. But about 20 years ago threads were impregnated in a similar manner according to the patent of the Palmer Cord Tire Co. The author himself has not been able to investigate to what extent the spraying process for obtaining crude rubber from latex is suited to the direct impregnation of cotton. It appears, however, that experiments with this aim in view are in progress. In any case all the possibilities for impregnation by spraying have not yet been exhaustively tested.

The simple arrangement of impregnation by spraying shown in Figure 10 can be perfected and made automatic. By the arrangement of several rows of spraying nozzles, reciprocating laterally, and by increasing the travel of the fabric the output can be increased to many times that of the experimental machine. Furthermore the spraying nozzles can be arranged on both sides of the fabric, to double the capacity. More rapid drying of the impregnated fabric can be attained by heating the stream of compressed air for spraying to about 90° C. so that the water in the finely dispersed latex evaporates and the cotton fabric is impregnated with rubber particles only. The lack of water in the impregnation of cotton with atomized latex is certainly only of advantage in relation to good adhesion.

The latex layer can be sprayed on so thickly that a further coating of the fabric with rubber on the calender can be eliminated. The spraying process requires no expensive equipment and makes possible an economical use of latex. To protect workrooms from becoming clouded with rubber particles it is necessary to enclose the spraying apparatus and to suction off any mists that may still form.

Seeing the good results already obtained, the impregnating method of spraying with latex described above is sure to enter into practical use soon.

EDITOR'S NOTE. The textile, paper, cordage, and bag industries are interested in latex.

Liquid Latex Seals Food Can

LATEX cement is rapidly displacing other forms of rubber sealing in the canned foods industry. The fact that this cement is an aqueous preparation permits its application by automatic machinery for filling the channels provided for it in tin can covers. Volatile solvent cements cannot be thus used because the rapid evaporation of the solvent would cause the cement to become thick and unmanageable at the delivery nozzle of the cement applying mechanism.

A number of patented machines have been devised for delivering a flow of latex cement into channels arranged on the inner surface of a can cover, there to solidify, by evaporation of its contained water, into an elastic rubber sealing ring. The details of these several mechanisms vary, but in each case the channel of the can cover and the cement nozzle are made to conform in their relative position and movement so that the flow of cement from the nozzle lays a coating of uniform thickness in the channel throughout its entire extent. Machines for this purpose receive, fill, and discharge can tops automatically.

In conjunction with such machines a conveying system is essential to conduct away the cemented covers. On this they are carried through a drying closet from which they emerge ready for use in sealing cans.

SO MUCH ABUSE HAS BEEN HEAPED ON OXYGEN FOR working ruin on rubber that it almost comes as a relief to hear it regarded by such an authority as F. Harriss Cotton as the rubber man's best friend especially in the processes preceding vulcanization. The admission of oxygen, or even ordinary air, into an inclosed mixer, he shows, helps very much in warming a batch and in speeding mastication, which cannot be said of nitrogen or other inert gas, or even of vacuo. Rubber thus treated becomes slowly more soft and soluble and better retains its "nerve."

EDITORIALS

See Relief from Native Planting

THE many who are more concerned about the enduring welfare of the rubber planting industry than about a passing price advantage will find much satisfaction in the assurance of leading European cultivators in Malaya that the rapid rise in native planting has practically reached its maximum, and that from now on there will be steadily less occasion to fear competition from that source. Native planting was stimulated chiefly by the prices prevailing a few years ago; and even when prices began to sag through a glutted market and a diminished demand, the natives seemed to redouble their efforts to derive all possible advantage. Of course they could operate cheaply as compared with the Europeans, and reckless planting methods have given surprisingly large, but temporary, yields.

But now, it is pointed out, the natives are realizing that, low as it is, overhead is a reality nevertheless and there is a definite minimum below which they cannot operate even in the crudest fashion. They may indeed have forced their output up to 50% of the market total, but, as some of the better informed European cultivators reason it out, there are economic reasons why they cannot demoralize the industry altogether. They cite the fact that discriminating buyers will always be willing to pay more for rubber well prepared and that the Europeans will probably always have better marketing facilities. In the opinion of some authorities Europeans, by reason of superior organization, should be able to keep 10 years ahead of the natives.

Apart from sentiment, which would favor generous and enduring recompense to the enterprising European developers of the great industry, it is highly desirable that their safe and sane methods should long prevail. It is not very comforting to imagine what might happen if the reckless native system ever got out of hand. There even looms the specter of a blight that might plague a vast area and do irreparable harm to the whole industry.

Barring an Efficient Antioxidant

ENCOURAGED with their great success in lengthening the useful life of rubberware, makers of antioxidants are now producing a wide variety of chemical compounds that markedly retard the oxidizing of many other goods than those of rubber. One preparation for bakers, for instance, is so efficient that it will keep bread from drying for months. The only reason that it is not being used is that it would conflict with the federal pure food law.

Absorbing Sales Handicaps

WHEN the first of the major tire manufacturing companies established a plant on the Pacific Coast a dozen years ago to serve 11 far western states and the trans-Pacific territory, there were many in the rubber trade who freely predicted that the only salvation for the other national operating concerns was to go and do likewise. True, 3 major companies have already followed suit and have found the move advantageous in serving their trade and in offsetting particularly transportation charges on products; but the stampede that many expected has not materialized.

Establishing properly equipped factories necessitates heavy capital investment, and adequately manning such concerns requires considerable overhead. True, various economies can be effected, as in saving on transportation of some primary raw materials, on heating, labor costs, building materials, etc.; but the advantage of the large saving in production cost is not realized at once.

Meanwhile many of the old eastern concerns are holding their own remarkably well against Pacific Coast competition. They concede, of course, that their products must have quality, that they must meet rivals' prices, and that distribution must be well organized, even to maintaining large and various warehouse supplies for the Pacific Coast trade. Apparently the old bugbear of transcontinental freight does not seem to give so much anxiety as heretofore.

Research as Unemployment Insurance

COMING at a time of economic letdown, such new products as cellophane and DuPrene, the "rubber-like synthetic" as some prefer to term it, instead of synthetic rubber, have been hailed as not only industrial boons but as outstanding proofs of the significance of research, and doubtless presaging the advent of other new materials of even greater importance in affording a certain amount of unemployment insurance.

Lawrence V. Redman, vice president of the Bakelite Corp., than whom few are better qualified by experience and achievement to speak on the value of research, makes a strong plea for adding to other inescapable charges in commercial ventures one for an adequate and sustained program of research without which, he insists, no industry can progress, if indeed it can survive. Here haste can not be regarded, it is a line of endeavor that may not be quickened, but often it yields returns as soon and as liberal as any industrial investment, an average experience being as low as 7 or 8 years.

What the Rubber Chemists Are Doing

A. C. S. Rubber Division Meeting

THE Rubber Division of the American Chemical Society met as scheduled at Detroit, Mich., February 25 and 26, 1932. The attendance averaged about 130. In addition to the 12 papers read, the following committee reports were made.

Report of Physical Testing Committee

The project before the Physical Testing Committee at the present time consists in carrying out a survey of the industry on the methods and equipment in use in the performance of oven aging and oxygen bomb tests on rubber samples. Fifty-nine questionnaires have been returned to the committee. These have been classified into 6 divisions as follows:

Mechanical Goods Manufacturers	14
Tire Manufacturers	13
Commercial Laboratories and Suppliers	13
Insulated Wire Manufacturers	5
Rubberized Fabrics	9
Footwear	5

The data from all these questionnaires have been classified and were summarized at a meeting of the Committee held in Akron on February 19. The Committee met again at Detroit, February 25, and after considering the summarized tabulations agreed on tentative recommended practices for oven and oxygen bomb aging. In the absence of the Chairman and several members, these tentative practices are being circulated to the Committee members for final study. When this work is completed, the Committee will present the proposed methods to the Division for consideration.

R. A. SCHATZEL,
Acting for Chairman R. P. Dinsmore.

Report of the Papers Committee

The Committee has been canvassed for an expression of opinion in regard to Chairman Bridgwater's suggestion that in addition to the 2 formal reviewers appointed to approve the paper for presentation and publication, that papers be submitted to at least 2 other reviewers who will be expected to lead a formal discussion at the meeting. The Committee is unanimous in approving this suggestion of Chairman Bridgwater's and suggests that the Rubber Division authorize that in the future all papers be submitted in quadruplicate, 2 copies of the paper to be sent out for formal review and approval and the other 2 copies for the review leading to the discussion. It is recommended by the Committee that this action be confirmed by the Rubber Division.

One of the members of the Committee has suggested that in the future when papers are sent to the various people for review the name of the author be omitted so that the paper will be considered solely on its merits. He expresses the opinion that reviewers may be influenced to a certain extent by their personal opinion of the author and that if the name of the author were withheld, we might have a more unbiased and impartial review than those now obtained. At the time of this meeting not all the members of the Papers Committee have replied to letters which embodied this suggestion. It is, therefore, recommended that the matter be held in abeyance until the next meeting of the Rubber Division. Reports which are at present in the hands of the Chairman of the Papers Committee are in disagreement on this point.

The members of the Division are asked to write to the Chairman of the Papers Committee if they have any opinions for or against this proposal. These opinions can then be given consideration by the Committee before the matter is drawn up for consideration at the fall meeting.

H. L. TRUMBULL,
Chairman.

Abstracts of Papers

Some Experiences with a Direct Accelerator Adsorption Test. A simple adsorption test has been applied to a large number of carbon blacks during its use as a production control test over a period of 2 years. The method is completely described and differs from previously described methods in that an extremely dilute solution of diphenylguanidine in benzene is employed. Significant differences in rate of cure are indicated by the direct adsorption test in case of channel blacks and several other pigment carbons. The test is not a measure of fundamental tensile or modulus characteristics. Use of the test in several separate laboratories indicates that it could be used generally by producer and consumer to evaluate carbon blacks. Results of a large number of tests are tabulated. F. H. Amon and R. K. Estelow.

Reactions During Vulcanization. II. The Reaction Between Zinc Soaps and Mercaptobenzothiazole. Fatty acids react rapidly with zinc oxide to form zinc soaps during milling; accordingly the action of fatty acid in the presence of zinc oxide is the same as that of an equivalent amount of the corresponding zinc soap. In accelerated stocks the zinc soaps in the mix react with the accelerator to form the active zinc accelerator compound. The equilibrium between the accelerator and zinc soaps results in the formation of a smaller amount of the zinc accelerator compound in the case of mercaptobenzothiazole than for many accelerators, and accordingly relatively large amounts of zinc soaps are required with it. Harlan A. Depew.

Heat-Resisting Inner Tube Stocks. To develop heat-resisting inner tube stocks a method of testing called air-bomb aging was developed. Tests showed that low sulphur, 1 to 1.25%; high acceleration, 2% or more based on the rubber content; relatively high percentages of antioxidant and relatively high volume loading, 20 to 25% based on the rubber content, were necessary to obtain a stock that would meet the requirements imposed by the air-bomb aging test. E. W. Booth.

Solubility of Organic Compounds in Rubber. A method for determining the solubility of organic compounds in rubber has been developed. Apparatus consisting of a constant-temperature oven designed to permit microscopic observation of the material in the oven has been constructed to facilitate the use of this method. Solubility data have been obtained on a number of organic compounds now commercially available to the rubber trade. An application of the solubility data to molecular weight determination has been made. Discussion of other uses for the solubility data is included. T. C. Morris.

Natural and Synthetic Rubber. IX. Constituents of the Rubber Hydrocarbon. Refractionation by temperature precipitation has been developed to separate the constituents of the rubber hydrocarbon from pale crepe. These are shown to be: 1. An insoluble component (20%); 2. A single soluble component (over 50%); 3. A highly soluble mixture (over 20%). A standard precipitation point was developed and used in these determinations. Thomas Midgley, Jr., Albert L. Henne, and Mary W. Renoll.

Rubber-Pigment Ratios in Batch Control. The viscosity, plasticity, and elasticity of rubber mixes have been investi-

gated in the raw and cured state. One, 2, or all of these properties may be present at the same time and have a direct ratio to the quality of the mix. They may be calculated or measured and serve as criteria of dispersion in the batch. The percentage dispersion of the pigments in the batch is the quotient of the actual instrument readings divided by the calculated readings. They can be taken by a modified Shore elastometer and durometer. Ample illustrations are cited to support the conclusions. Howard L. Wiley.

Method for Maintaining Uniformity in Factory Mixed Stocks. A method based on determination of load at constant elongation has been developed whereby every factory mixed batch may be tested. A machine with special type of jaws utilizing a new modification of the dumbbell strip has been designed for this purpose. Repeated experiments have shown that the new method gives results as good as are obtained with standard procedures. Experiments with curing times and temperatures and with testing procedures are discussed. The method has been found to give consistent results over long periods of time and to be sensitive to variation in the stocks. An outline of the testing routine is given. J. E. McCarty and Edward Cousins.

Studies in the Vulcanization of Rubber. V. Dielectric Constant and Power Factor of Vulcanized Rubber. This paper gives dielectric constant and power factor of rubber containing 2 to 32% sulphur at 30°, 50°, 75°, and 100° C. from 600 to 2,000,000 cycles. The values vary greatly with composition, temperature, and frequency. The results do not disprove the dipole interpretation previously advanced but show that it requires modification. Addition of sulphur to all the double bonds does not render the rubber molecule non-dipolar. The low dielectric constant of hard rubber at room temperature, which led to the idea of such compensation, is due to its rigidity. Its charge and discharge period is over 24 hours. At higher temperatures it softens; the period becomes short, and dielectric constant and power factor are high. Studies by others of compressibility and thermal expansion reveal 2 states with a fairly sharp transition temperature: a hard state in which vulcanized rubber resembles a solid, and a soft state in which it behaves somewhat like a viscous liquid. The dielectric behavior gives additional support to the concept of solid and liquid states. The agents producing the electrical effects are not identical but possess widely different relaxation times. The power factor of vulcanized rubber decreases on stretch. The actual dielectric mechanism is not revealed by the data. Donald W. Kitchin.

Grit in Carbon Black. The Effect on the Flexing Resistance of Vulcanized Rubber. Rubber channel black has been found to contain amounts of grit retainable on a 325-mesh screen varying from 0.05% to 1.74%. This residue is shown to be objectionable from the standpoint of the flexing resistance of rubber compounds, higher concentrations being correspondingly more harmful than lower concentrations. The coarser fractions appear to give rise to larger cracks and earlier appearance of cracking than do the finer materials. Even that which passes a 200-mesh screen but is retained on a 325-mesh is objectionable. J. N. Street.

Effect of Curing Temperature on the Quality of Vulcanized Rubber. A review of the literature permits no definite conclusion concerning the influence of temperature of vulcanization on the ultimate quality of a rubber product. Some investigators claim equal properties at different curing temperatures, others superior properties at low temperatures; while still others believe superior qualities are obtainable at higher temperatures. Concerning the influence of temperature on aging, no conclusive data are available. The data presented in this paper concern a D.O.T.G. stock, containing reclaimed rubber and no antioxidant, and an M. B. T. stock, with an antioxidant. Original physical properties are presented, together with Geer oven aging, Bierer-Davis bomb aging, and natural aging. The data presented show that there is no influence of the temperature of cure on the tensile properties at maximum in the case of the D. O. T. G. stock, with a trend toward slightly higher tensile strength with decreasing curing temperature in the case of the M. B. T. stock. Natural as well as artificial aging of the D. O. T. G. stock shows that the lower the temperature of cure, the better the aging. The data on the M. B. T. stock show only a trend toward better aging with lower temperature of curing. N. A. Shepard and J. N. Street.

Effect of Size and Shape of Pigment Particles on the Stiffness of Rubber. The effect of size and shape of pigment particles on the stiffness of rubber is studied from a theoretical standpoint. Resorting to analogies, the stress concentration is determined around large particles, and the assumption made that the stresses are relatively the same for small particles. From the data obtained the stiffening of rubber by pigments is explained on the basis that the rubber stress-strain curve changes shape. C. E. Barnett.

Effect of Cadmium Compounds on Typical Organic Accelerators During Vulcanization. Cadmium may occur in zinc oxide in the form of oxide, hydroxide, sulphate, sulphide, chloride, and carbonate in quantities up to 0.5% or slightly more. Using 10 parts of zinc oxide which contains 0.5% of cadmium, the latter would not exceed 0.05 parts on the rubber. Because of testing inaccuracies and the masking effect of impurities, small amounts of cadmium may be difficult to detect. To eliminate such complications a base formula was selected using U. S. P. zinc oxide to which were added various amounts of cadmium compounds. With few exceptions, these compounds retard tetramethyl thiurammonosulphide but slightly advance the rate of cure of butyraldehyde aniline, di-ortho-tolyl-guanidine, and mercaptobenzothiazole. General analytical practice is insufficient to identify the various forms of cadmium present, and the action of cadmium-bearing zinc oxides is difficult to predict. Three samples of zinc oxide of the same manufacture gave widely different results with tetramethyl thiurammonosulphide. Two samples of comparatively low cadmium content assayed approximately the same. One was fast and the other slow curing. The third assaying appreciably more cadmium produced an intermediate rate of cure. M. K. Easley and A. C. Eide.

Coming Division Meeting

THE next meeting of the Rubber Division of the A. C. S. will be held in connection with the 84th meeting of the American Chemical Society in Denver, August 29 to September 2, 1932. In deciding to hold a meeting there the division had in mind particularly the opportunity which would be afforded to members of the division resident on the Pacific Coast and in the Midwest.

Chicago Group

THE spring meeting of the Chicago Group of the Rubber Division, A. C. S., was held March 18, 1932, in the College Inn of the Hotel Sherman, Chicago, Ill. Noah Van Cleef, of the firm of Van Cleef Bros., discussed "The Sources of the Rubber Hydrocarbon." Motion picture films taken by Mr. Van Cleef on his recent trip to the far eastern rubber plantations were shown, also films on the mining of gold and diamonds.

Akron Group

THE Akron Group of the Rubber Division, A. C. S., held a meeting at The Akron City Club on Monday evening, March 7, 1932, attended by about 200 members and friends. The new officers then elected for the ensuing year are H. J. Conroy, chairman; H. A. Bourne, vice chairman; E. H. Baker, secretary-treasurer.

G. F. A. Stutz, George Haslam, and B. R. Silver, of The New Jersey Zinc Co., presented a paper on some of the possibilities in manufacturing oxides having various characteristics to meet specific requirements. It was pointed out that particle size had a very marked effect on reenforcing properties and that a surface treatment of the oxides aided materially in incorporation without detrimental effects. The paper was illustrated with photomicrographs and curves of experimental work, and a moving picture film of the facilities at the Palmerton laboratories of the N. J. Zinc company was shown.

J. W. Ayers, director of research for the C. K. Williams Co., presented some extremely interesting information on oxides for rubber colors. He explained the difficulties of color description transmission and showed curves made by a commercial color analyzer which was developed to describe a color without having a sample present. Lantern slides were shown to illustrate the process and the equipment

used in manufacturing oxides, and numerous rubber samples were presented to indicate the differences in coloring values of various materials.

A. J. Musselman entitled his talk, "The Experiences of an Inventor." He told of some of the developments in racing bicycle tires and the experimental work done to develop a tire of minimum resistance. He also described some interesting tests and presented data on the more recent development of the "doughnut" tire.

Boston Group

THE Boston Group of the Rubber Division, A. C. S., will hold its first meeting of the year on April 7 at the Hotel Continental in Cambridge, Mass. The dinner at 6:15 p. m. will be followed by the following program of papers:

"Some Effects of Heat in the Vulcanization of Rubber" by Prof. W. K. Lewis, of M. I. T., who will present the latest concepts of this phase of the vulcanization reaction.

"The Romance of News Gathering" by Alton H. Blackington, who will demonstrate his paper with a movie projector.

The meeting has been planned to allow full opportunity for discussion, social contact, and an entertainment program of real merit. Ticket reservations at $1.75 each can be made with T. M. Knowland, secretary-treasurer, in care of Boston Woven Hose & Rubber Co., Cambridge, Mass.

North Jersey Section

G. S. WHITBY, director, Division of Chemistry, National Research Council of Canada, addressed the North Jersey Section, A. C. S., on "Synthetic Rubber." The meeting was held at the Hotel Winfield Scott, Broad St., Elizabeth, N. J., on Monday, March 14, at 7:45 p. m.

Improved Varnishes for Auto Topping and Leatherette

THE advance in durability of auto top finishing varnishes for the automotive trade in the past few years has been amazing. Three or 4 years ago the best piece of topping on the market would show conspicuous dulling of luster and surface checking after one month's outdoor exposure in Florida and would be absolutely ruined down to the rubber in 3 months. The rubber topping varnish industry seemed doomed because of the outstanding durability of competitive topping finished with pyroxylin and oil coatings.

However new types and new sources of raw material for varnish and improved types of equipment for varnish manufacture led some of the more progressive rubber manufacturers to cooperate with varnish technicians and modify their stock compounds to adjust them to developments in varnish formulation. Thus was created the topping material of today, which has regained the prestige once thought lost.

The modern 2-coat finish will retain the greater part of its original luster and preserve the rubber practically without surface checking after 6 months to a year of Florida exposure. Even the modern one coat finish looks about as good as new after 3 or 4 months in Florida. It must be noted, however, that these results ensue only when the rubber compound and varnish have been carefully adjusted to each other.

Equally important advances have been made in the finish of leatherette and raincoat material. Until recently the bromine finish was almost universally used. The superior "slip" glassy surface, resistance to marring and water, characteristic of pyroxylin lacquers seemed most desirable to rubber technicians.

Various defects, however, both in the formulation and application of rubber lacquers at first gave rise to complaints of streaking, cracking, and peeling, which threatened to prevent the acceptance of the lacquer finish by the industry.

Once again new raw materials and improved methods of application of lacquer produced a finish on leatherette better than the old bromine finish. The stock is coated with a wash coat of shellac at the calender and is then lacquered on a coating machine. It is next festooned in an oven and cured about an hour at approximately 250° F. The resultant finish has a smoothness and permanent elasticity which is unsurpassed. Data from The Monroe Sander Corp., 39-25 21st St., Long Island City, N. Y.

Gasket Compound

A special gasket stock, designated as No. 1,000 Gasket Compound is a white, odorless, sulphur-free rubber composition. The material is flexible, practically incompressible, and highly satisfactory for use where the surface of the gasket can be tightly clamped. Long exposure to the weather causes no noticeable hardening or stiffening of the gasket. Mildly alkaline solutions have no apparent effect upon it. Although this compound is not oil proof, it is said to be much more resistant to mineral oils than other gasket stock.

It is not generally recommended for applications where resistance to hot oil is of primary importance. By tight clamping and exposing as little of the compound as possible to the oil it may be used for cold oil. It is not recommended for service where exposure to naphtha, gasoline, kerosene, benzine, or any other such solvent may occur. This compound is especially suitable for applications where the primary purpose is to exclude moisture.

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Casing Construction for Pneumatic Tires. J. G. Bulger, *India Rubber J.*, Mar. 5, 1932, pp. 288-89.

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Latex and Dispersions

Latex, Bags, and Bag Materials

G. D. Kratz

THE manufacture of bags and bag materials constitutes an industry of considerable size when measured by the total investment involved and the annual value of its products in dollars. Further, it is one of wide diversification. Broadly speaking, there are 3 different types of bags: namely, paper, mesh, and fabric. In each case are uses for these products which require them to be either waterproof or moisture resistant.

To refer to the manufacture of bags as an industry in itself may not be strictly accurate. Few, if any, manufacturers produce all types of bags. More often bags and bag materials constitute an important division of a major industry. The paper, textile, and cordage industries all manufacture bags or bag material of one type or another in addition to the independent or exclusive bag manufacturer who may produce special types of bags for specific purposes.

Paper bags do not ordinarily require waterproofing. In most cases they are not even highly moisture resistant. It, nevertheless, would be a decided step in advance if even the ordinary paper bag furnished by the corner grocer were superficially waterproofed if only to the extent of not having its strength impaired when used as a container for moisture laden vegetables or other commodities of a similar character. In the case of cement bags or bags used for shipping such substances as plaster of paris, waterproofing is most essential. With hygroscopic materials similar to calcium chloride, waterproofing is necessarily imperative.

Paper cement bags are usually made of a 50-pound paper stock of high density. In many cases the bags are made up of 2 or more thicknesses of paper, one or more layers being impregnated with oil, asphalt, or treated with other agents of similar character to increase the density and water resistant characteristics of the paper. In some instances a cellophane coated paper has been employed for one layer of cement bags. The latter procedure is necessarily somewhat expensive for ordinary purposes.

A properly compounded latex solution lends itself well for employment as a waterproof coating on paper bag stocks. It adheres well to the paper and can be readily applied. Further, and this point is most important, most latex solutions are liquid enough to insure uniform application to the surface. The covering power of latex on paper is relatively large. One gallon of compounded latex solution containing 5 to 6 pounds of solids well covered, with 2 coats, 1,000 square feet.

Latex has a marked effect on the density of a paper stock as measured by the permeation of air through it. When tested on a standard type of densometer, the permeation value of a good grade of paper will be increased from a few minutes to several hours by the application of a thin film of compounded latex solution.

Another totally different type of bag where latex may be employed to advantage is in the manufacture of garment sacks or protectors. At present several different types of garment protectors are on the market in addition to the ordinary paper bag used by dry cleaners. One of the most popular is made of Argentine cloth, and sells at a relatively high price. This fabric is prepared by passing a fine net or tarlatan through a glue or gelatine solution and drying. Films form between the openings in the net, making a highly transparent and moisture resistant material. When made into garment bags, they are said to be quite effective against moths.

A bag of the above type in addition to being serviceable must be decorative. Transparency is greatly to be desired, at least to the point where the garment is sufficiently visible to identify it without removal from the bag. While the transparency of Argentine cloth might be difficult to duplicate with latex solutions, it can be approximated sufficiently to make a new and useful type of bag.

Another form of mesh bag is manufactured from a net composed of either paper or vegetable fiber twine. Bags of this type are used in substantial quantity for shipping fruits and vegetables. Certain advantages may be claimed for the fiber twine bag if the net has been treated with latex solution; whereas in the case of paper twine, latex can be used to good advantage in making the twine itself.

The possibilities in the impregnation of fabric bags are legion, chiefly because of the diversity of contents shipped in bags or sacks of this type. Many fabric bags at present are subject to serious objection on the part of both shipper and consignee. Oily or greasy substances naturally impart their objectionable characteristics to untreated fabric bags. In other instances even a small amount of fiber from the bag material is a serious objection if it becomes mixed with the contents. Sodium nitrate, ammonium sulphate, and many other chemicals, when shipped in fabric bags, deteriorate the bag stock and impair the strength of the fabric. The same is true of fertilizing materials. In some cases the action is so pronounced that fertilizers are bagged just before shipment in order to minimize as far as possible the time the corrosive action of the contents will have to act upon the bag.

In other cases the bag must be dustproof and prevent the sifting of the contents through the fabric. Light calcined magnesia, for example, is a substance subject to the above tendency.

A fabric bag stock impregnated with latex solution naturally prevents the absorption of grease, oil, or moisture. If heavily impregnated, the fibers are sufficiently cemented together to insure that none become loosened and mix with the contents of the bag. Compounded latex solutions may be prepared which are highly resistant to the action of either acids or alkalies. A skim coat of rubber on the inside of a bag effectively prevents the sifting through of even the lightest and finest materials. Bags of the latter type are already being received from abroad.

This fact raises a point which in the future will probably receive considerable attention: namely, whether or not an impregnated fabric bag is preferable to one which is skim coated on the inside only. A thoroughly impregnated bag material assumes that the fabric has been treated with solution to the point of saturation and that, when dried, the material as a whole has uniformly absorbed the maximum amount of solution necessary for the purpose intended. Such a procedure requires solutioning, the evaporation of a substantial amount of water and presumably a rather high material cost as the amount of solids retained by the fabric would be relatively large. Such a bag, however, would offer protection to the contents from the outside as well as from within.

On the other hand skim coating one side of a bag fabric can be accomplished by passing the stock through squeeze rollers or by application with a scraper using a heavy paste. If the paste be highly compounded, there is less water to evaporate than in the former operation, and the actual amount of rubber applied to the surface should be considerably less than would be used to effect an impregnation. The outside of the bag would, in this instance, be unprotected. There should be little, if any, difference in the cost of vulcanization of the 2 types.

Paper, mesh, and fabric bags either waterproofed or impregnated with latex are already on domestic or foreign markets or are in process of development. Their advantages over former types used for the same purposes would indicate active interest along these lines in the immediate future.

Patents

United States

18,355. (Reissue). **Gasproof Balloon Fabric.** C. M. Carson, Cuyahoga Falls, assignor to Goodyear Tire & Rubber Co., Akron, both in O.

1,842,706. **Rubber-Fiber Article.** F. O. Woodruff, Quincy, assignor to H. H. Beckwith, Brookline, both in Mass.

1,843,581. **Fiber-Rubber Material.** R. P. Rose and A. F. Owen, both of Jackson Heights, N. Y., assignors to Mechanical Rubber Co., Cleveland, O.

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1,845,688. **Rubberized Fabric.** F. H. Untiedt, Chevy Chase, Md.

1,846,164. **Rubber Resins.** D. F. Twiss and E. A. Murphy, both of Birmingham, assignors to Dunlop Rubber Co., Ltd., London, all in England.

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Dominion of Canada

319,440. **Rubber-Fiber Article.** Beckwith Box Toe, Ltd., Sherbrooke, P. Q., assignee of F. O. Woodruff, Newton, Mass., U. S. A.

319,546. **Articles from Aqueous Dispersions.** Dunlop Rubber Co., Ltd., London, and Anode Rubber Co., Ltd., Guernsey, Channel Islands, assignees of A. S. King, Birmingham, all in England.

319,727. **Rubber Manufacturing Method.** Dunlop Rubber Co., Ltd., London, and Anode Rubber Co., Ltd., Guernsey, Channel Islands, assignees of D. F. Twiss and E. A. Murphy, co-inventors, both of Birmingham, all in England.

United Kingdom

359,205. **Rubber Composition.** O. C. Hosking, Sydney, N. S. W., Australia.

359,582 and 359,583. **Golf Ball Composition.** Dunlop Rubber Co., Ltd., London; Anode Rubber Co., Ltd., Guernsey, Channel Islands; E. A. Murphy, D. F. Twiss and R. G. James, all of Dunlop Rubber Co., Ft. Dunlop, Birmingham.

359,584. **Porous Rubber.** Dunlop Rubber Co., Ltd., London; Anode Rubber Co., Ltd., Guernsey, Channel Islands; E. A. Murphy and E. W. B. Owen, both of Ft. Dunlop, Birmingham.

359,924. **Bituminous Composition.** S. S. Sadtler, Springfield Township, Pa., U. S. A.

359,950. **Molding Pulp.** H. D. Elkington, London. (Flintkote Co., Boston, Mass., U. S. A.)

360,371. **Artificial Leather.** Soc. Invenzioni Brevetti Anon.-Torino, Turin, Italy, assignee of A. Mackay, Asbury Park, N. J., U. S. A.

360,482. **Abrasive Composition.** Carborundum Co., Ltd., Manchester.

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361,025. **Fabric Coating Composition.** P. Stamberger, Budapest, Hungary.

361,398. **Latex Impregnated Belting.** P. H. Head, Attenborough, Nottinghamshire.

Germany

544,641. **Aqueous Rubber Dispersions.** Anode Rubber Co., Ltd., London, England. Represented by W. Karsten and C. Wiegand, both of Berlin.

Dipped Goods from Latex

THE Metallgesellschaft A. G., Frankfurt a. M., Germany, produces gloves, finger cots, etc., by directly coagulating aqueous rubber dispersions, particularly latex. The latex may be in its natural state, concentrated, vulcanized, compounded, etc., and the coagulant, in a gaseous state, is made to act on the latex from the surface of the form. These forms may be made of highly active material and may then be charged with the gaseous coagulant before being dipped into the latex, or the gaseous coagulant may be allowed to penetrate the pores of the form while it is being dipped and so act on the latex. In either case articles of uniform thickness and of varied shapes can be made from latex by this method.

The same concern produces reversible concentrates of latex by adding salicylates and small amounts of alkali instead of the usual soapy protective colloids and then concentrating the latex. Thus the disadvantages of soapy colloids are eliminated or at least very considerably decreased when these protective colloids are entirely or partly replaced by the salicylates. The alkali content is then kept so low that the concentrate just tints phenolphthalein pink.

Electro-deposition

THE electro-deposition of rubber from vulcanized or unvulcanized latex is facilitated by the use, in addition to the latex, of a liquid or solid electrolyte.

It is found in practice that the internal source of current gradually exhausts itself after a time. It is possible to maintain the voltage constant by means of an auxiliary external current, but this is utilized only to ensure that the thickness of the deposit can be controlled by time instead of by ampere hours.

As an example, to ordinary commercial alkaline latex a solution of ammonium chloride is added in insufficient quantity to cause coagulation, e. g. in the proportion of up to 20 parts by weight of ammonium chloride to 100 parts by weight of latex. Electrophoresis of this mixture is conducted by the use of an external source of current of such voltage that the total voltage between the electrodes shall be approximately 1.5 volts, thereby effecting deposition of the rubber upon the anode. The electrodes employed may be a zinc anode and carbon cathode, and the latter may be employed in conjunction with a depolarizing agent.

The deposition of the rubber from the latex can be continued until the desired thickness of rubber has been obtained upon the anode element, which may be shaped to give any desired form to the deposited rubber. The article is then complete in the case of vulcanized latex, and in the case of ordinary commercial latex it can then be vulcanized by any known method.

Uniting Rubber to Metals

A STRONG, permanent union of rubber to metal which is not affected by heat, moisture, or other solvents is possible by means of a cement consisting essentially of latex and hæmoglobin (a material obtained from clotted blood) together with certain vulcanization ingredients, as indicated in the sample formula.

The invention consists in the discovery that if a tanning agent for hæmoglobin, formaldehyde, for example, is incorporated with a latex-hæmoglobin mixture, a cement is produced that will bond rubber to metal most tenaciously. The reason is that the hardening of the hæmoglobin by the tanning agent renders the vulcanized cement union waterproof. Other tanning agents that may be substituted for formaldehyde are potassium dichromate, potassium ferrocyanide, or aluminum sulphate.

Cement Formula

Although the proportions of the various ingredients employed in the cement may be varied within relatively wide limits, the following is a specific example of a compound whose use insures highly satisfactory results:

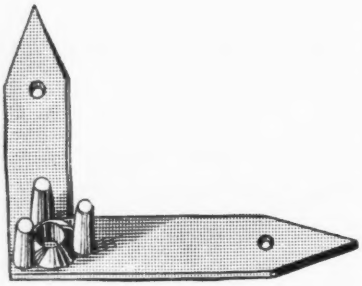
Hæmoglobin	100 gr.
Water	300 cc.
Sulphur	45 gr.
Zinc oxide	5 gr.
Diphenylguanidine	1 gr.
Latex (30% concentration)	575 cc.
Formaldehyde (40% concentration)	10 cc.

To attach rubber to metal this cement is spread in a relatively thick coating upon a freshly cleaned metallic surface. It is permitted to dry for approximately ½ hour at 65° C. (149° F.) and then for 1½ or 2 hours at 120° C. (248° F.) in order thoroughly to dry and bake the material. The freshly dried surface is permitted to cool and is roughened with a wire brush. Upon this surface is then applied thoroughly cleaned rubber stock such as that employed in the manufacture of solid tires, wringer rolls, etc. The rubber is then vulcanized according to the usual methods.

Latex Proofing

THE discovery has been made that soluble salts of true sulphonic acids having a high wetting power can be used with advantage for preserving and improving the application of latex for impregnating textiles, leather, etc. The addition of the salts indicated is of particular importance when vulcanization of the latex is to be effected by sulphur dioxide and sulphuretted hydrogen (Peachey process). Hitherto it has not been possible to vulcanize latex by this process, since it readily coagulates under the action of sulphur dioxide. The presence of the salts of sulphonic acid prevents any coagulation and thus the latex can be vulcanized without drawbacks.

New Goods and Specialties



Improved "Site-Rite" Tee

Rubber Golf Tee

FROM the Canada Golf Ball Co., Ltd., 620 King St. W., Toronto, Canada, comes an improved all-rubber golf tee, here illustrated, that should find a ready welcome among golfers. This tee, of very soft rubber with minimum resistance, is to be used on grass or hard surfaces in conjunction with a celluloid tee.

This golf accessory, if properly used, is said to direct the player's drive by indicating the position of the feet in relation to the direction desired. To secure such a stand aim one arm of the tee toward the green; then take stance, and the directing arm will seem to be off direction, an optical illusion. To offset hooking or slicing, the pointer should be aimed slightly to the right or the left as required.

Gay Toy Balloons

IN THE Spring come birds and bees and blossoms and—balloons. Each succeeding year brings more colorful delights for the children. Now swaying in the breeze will be glimpsed Zig Zag and Agate balloons, novel creations of The Oak Rubber Co., Ravenna, O.

As seen from the illustration, 8 zig zag stripes flash around one toy, all meeting at the top. These stripes are printed in 2 contrasting colors, both different from the solid background of the balloon; and with the wide variety of colors available, consider what a gay effect is achieved by bunching a group of the multi-hued playthings.

Zig Zags are made in 2 sizes: No. 70 gas, inflating 10 inches; and No. 90 gas, inflating 11 inches.

Agate, of gorgeously colorful appearance, offers a strikingly attractive blending of many brilliant shades. The result is a pattern very similar to the banded agate.

Oak Rubber offers, too, a neat package of distinct merchandising merit. The box, printed in attractive colors, contains 3 toy balloons visible through a glazed paper window.

The company also markets a toy outfit which gives the children the fun of making an airship which looks just like the giant *U.S.S. Akron.* The neat looking envelope in which this is sold contains a large silver airship balloon and cut-out paper parts for making control car, tail fins, propellers, and other parts. These are of gummed paper; so assembling the toy is easy.

Sanitary Socks with Ankle Supports

TO ELIMINATE the need of cumbersome ankle supports over heavy sweat socks, Bike Web Mfg. Co., 2500 S. Dearborn St., Chicago, Ill., has designed Lastex Sanitary Socks which consist of firm elastic supports knitted right into the socks. The support, which strengthens and protests ankle ligaments, is said to keep its elasticity and its efficiency. The socks, made of core yarn, are reported by the manufacturer to be less cumbersome, more convenient, equally efficient, longer lasting, easily laundered, and less expensive than ankle supports and sweat socks.

As the rubber in these protectors is fashioned in an entirely new manner and not vulcanized by the usual heat method, the socks stand laundering much better than ordinary elastic. This use of rubber is made possible by a new patented process

Merchandising Package

Lastex Socks

of knitting spun rubber into a compact, yet highly elastic fabric.

Three sizes, small, medium, and large, are available, for the superelasticity of the socks, which stretches in both directions, insures perfect fit for all feet. These socks are well suited to basketball, track, baseball, skating, and golf as well as general gymnasium work.

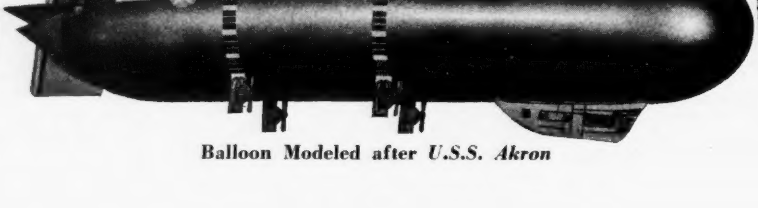
Sponge Rubber Cleaner

SPONGE RUBBER is put to ever-increasing uses especially since one of its outstanding characteristics is its cleansing ability. Even when used as a cleaner, sponge rubber may be applied to many surfaces with most satisfactory results. One such product, known as Klenal and made by The Sponge Rubber Products Co., Derby, Conn., demonstrates this usefulness of sponge rubber. Klenal is a rectangular piece of sponge rubber $7\frac{1}{2}$ by $4\frac{7}{8}$ by $\frac{7}{8}$ inches with slightly rounded corners, made by joining 2 flat pieces of sponge rubber, each of which is a different color, together.

Used dry, this cleaner is recommended for wall paper, window shades, draperies, suede shoes, spats, felt hats, and upholstery. It is considered satisfactory also as a bath sponge or wash cloth. Another service it fills is as a mat under vases, candlesticks, etc. to protect the fine finish of furniture. Klenal is suggested for use under potted plants, as any water spilled on it will not seep through.

For reaching near the ceiling Klenal can be clamped in any mop handle. To keep this sponge cleaner sanitary it can be readily cleansed and sterilized with soap and boiling water.

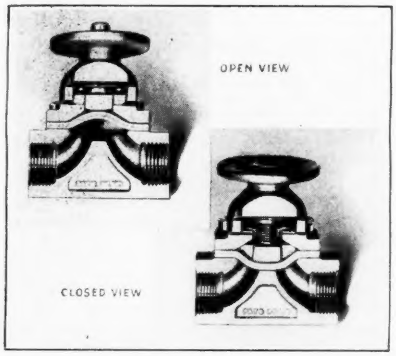
Zig Zag Balloon



Balloon Modeled after *U.S.S. Akron*

Agate Balloon

New Machines and Appliances



Saunders Type Valve

Improved Valve

AN IMPROVED valve is pictured in open and closed positions in the illustration. This valve was designed originally to eliminate leaks in water and air lines that cause a large unnecessary expense each year. The valve has no metal to metal seats, no stem packing or stuffing boxes, and is suitable for general purposes. The materials being handled never reach the valve bonnet. The rubber diaphragm with its duck insertion reenforcement protects all the working parts from the substances handled. This feature is particularly valuable in handling volatile liquids, gases, corrosive liquids, or those containing grit.

Access to the bonnet or body does not require removal of the valve from the line. In the closed position the diaphragm is compressed between the compressor follower and the seat. An even distribution of pressure on the diaphragm is secured by the proper design and machining of the seat and the compressor. Hills-McCanna Co., 2349-2359 Nelson St., Chicago, Ill.

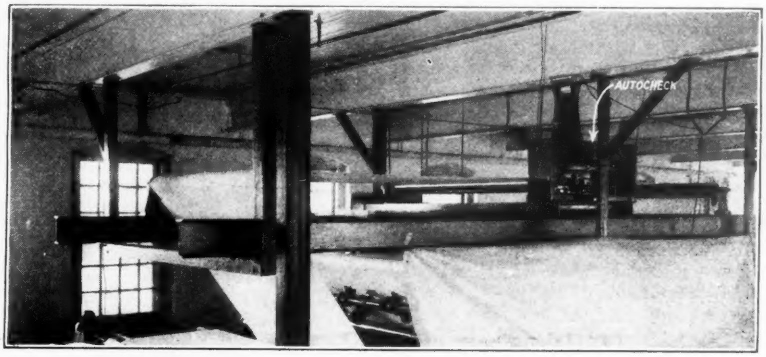
Fabric Weighing Device

RUBBER proofers and sheet material manufacturers by utilizing the continuous auto-check method here illustrated can exercise continuous control over the weight of their product, as contrasted with intermittent control from caliper or cutting weighing tests.

In operation, the auto-check method gives instant warning of any variation from the predetermined standards, and hence eliminates the waste of reprocessed or discarded batches of material. The practical value of this device is proved by its wide acceptance among manufacturers of roofing material, rubberized fabrics, wall board, and paper.

The method is simple in operation. The material to be tested passes over 3 rollers all in the same horizontal plane. One-half of the material between the end rollers is supported by the middle one. This roller is mounted on the auto-check mechanism and is the weighing element in the device. The resultant reading is the weight of the middle half of the material. The load to be weighed is counterbalanced by an appropriate beam and poise. A pendulum equipped with a pointer and traveling over a recording chart indicates any variation from zero or the predetermined standard weight.

Opérated by the gravity principle, this device is not subject to temperature variations or the physical characteristics of the material used. The indicator is large enough to permit ease of reading at distances up to 30 feet with no sacrifice of accuracy. The apparatus is available for any capacity desired and can be adapted to the material used. For example, a wide type can be furnished with a double indicator to check one side of the material with the other side. Toledo Precision Devices, Inc., Toledo, O.



Toledo Continuous Auto-Check

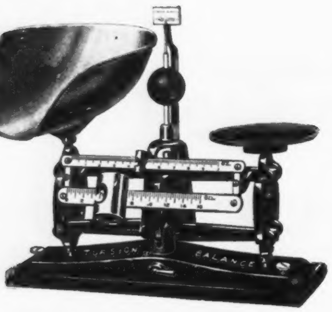
High Capacity Steam Trap

HIGH capacity and simplicity feature the free floating lever steam trap here illustrated. This trap uses the inverted bucket principle which insures nonair binding, self-scrubbing, and other advantages characteristic of the inverted bucket design.

In the illustration the pencil points to the valve lever which loops over 2 guide posts at one end and engages the bucket hook at the other. When the bucket floats, it pushes directly against the valve stem, forcing the valve to its seat. Steam pressure within the trap holds the valve against the seat. Water entering the inverted submerged bucket causes the bucket to lose its buoyancy and exert a pull on the end of the lever. The valve is opened as soon as the weight of the bucket multiplied by the high leverage is greater than the pressure holding the valve against the seat. When opening, the valve lever fulcrums on the knife edges which bear directly on the valve seat.

Using a high leverage for opening the valve and a direct 1 to 1 lift for closing, prevents excessive wear on the operating mechanism. Substituting knife edges for the conventional pivots largely eliminates friction and also makes it possible to open larger diameter orifices at a given pressure. Stainless steel wearing parts and only 2 moving parts insure low maintenance costs. The extremely simple make-up of the new trap facilitates construction of the working parts from special alloy steels for acid, alkali, or corrosion resistant service. A special acid resisting trap has been developed for handling condensate from vulcanizing equipment where sulphurous acid may be encountered. Armstrong Machine Works, Three Rivers, Mich.

Armstrong Steam Trap



Torsion Balance No. 6100

Laboratory Scale

AMONG the torsion balance type of scales built for fabric calculating and rubber weighing in laboratories is one designed for color weighing, shown in the illustration. This is well adapted for accurately weighing high power accelerators. Its capacity is 1 lb. and sensitivity 1 gr. The upper beam is graduated in 1-oz. by 1/100-oz. The lower beam is graduated in 1-lb. by ¼-oz. The scale has a brass scoop to hold material and a platen for weights. The Torsion Balance Co., 92 Reade St., New York, N. Y.

Wire Measuring Machine

THE productimeter illustrated is designed for measuring wire that indicates quickly and accurately the lineal measurement of wire, cord, or any other similar material from .005- to ½-in. in thickness. The variety of possible mounting positions and the several standard styles available make this machine applicable to practically any job of measuring the type of materials mentioned.

This new wire measuring meter features an automatic brake which has proved itself practical and accurate in a series of tests under working conditions. The braking is accomplished by a sturdy spring; the tension of which is adjustable to accommodate various thicknesses of wire.

Measuring wheels can be furnished with a straight milled surface, a cross knurled surface, or a composition rubber surface for accommodating different types of material to be measured. These wheels, like the entire frame, are made of heavy cast iron and run on a bearing surface equipped with oilers. Wear is practically eliminated. The productimeter operates at a speed of 400 to 600 f.p.m. depending upon the style required for the work. It can be furnished with the counter facing front, back, or to the side of the measuring device operating in either clockwise or anti-clockwise rotation. This makes the machine practical for mounting and measuring under practically any condition. Durant Mfg. Co., 1925 N. Buffum St., Milwaukee, Wis.

Durant Productimeter

Impact Tester

THERE has long existed a need of a modern impact tester made in accordance with the standards of the American Society for Testing Materials and having fine sensitivity. The machine here pictured and described will, therefore, be of interest to manufacturers of hard rubber and other molded materials.

The machine is made for both Charpy and Izod test systems and is graduated directly in ft.-lbs. of energy absorbed by the specimen. The range is 0 to 2 ft.-lbs., and each graduation is .01 ft.-lbs. Higher test ranges may also be had if desired.

Schopper Impact Tester (Charpy System)

In the Charpy test, the specimen, ½- by ½- by 5-in. is laid horizontally from anvil to anvil. The pendulum hammer is dropped from a fixed height. It strikes the specimen and passes through, then continues to swing on the other side, carrying with it an indicating needle. The height to which the pendulum swings coincides with the amount of energy absorbed by the specimen.

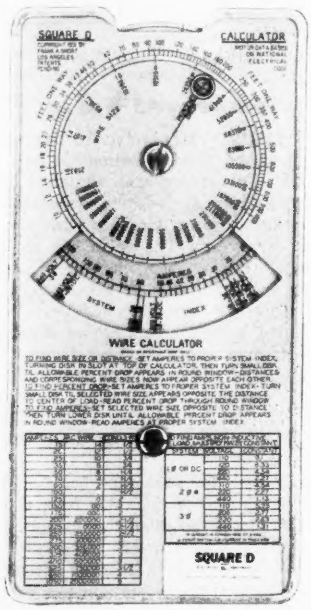
In the interest of greater clearness, assume that no test specimen has been placed on the anvils in the path of the falling pendulum. Then the pendulum will swing the full distance and the scale will read zero. However, when a test specimen is placed on the anvils, the hammer has a certain amount of kinetic energy at the point of impact, and some of that energy is absorbed in breaking the specimen. The amount of energy so absorbed is determined by the height to which the pendulum hammer swings after breaking the specimen and is indicated on the quadrant.

In the Izod test system the test specimen is gripped in the vertical axis; otherwise the test is made as described for the Charpy system. Not only is this testing machine made in conformity to A. S. T. M. standards and with the highest precision workmanship, but the results are read direct from the scale. No calculations are necessary since the quadrant is graduated to read ft.-lbs. of energy absorbed by the test specimen. Testing Machines, Inc., 314 Broadway, New York, N. Y.

Wire Calculator

ELECTRICIANS, inspectors, and engineers in rubber and cable plants are certain to appreciate the convenience of the handy pocket calculator here pictured.

This device is compact in size, 7 inches long by 3½ inches wide by ¼-inch thick. It fits into a neat case and can be easily carried in the pocket. With it the electrical man has at his finger tips all wiring



Square D Wire Calculator

and motor data, eliminating hours of figuring and providing him with accurate data at the turn of one of 3 dials. There are 2 calculators, one for computing wiring data and the other for computing motor data.

The operation of the calculator is simple. The wiring calculator for interior and conduit wiring problems will figure any one of the 4 items: amperes, feet of wire, size of wire, and per cent drop. The dials are easily set, and the reading is automatically given.

The motor calculator gives data on the 3 principal types of 220 v. and 440 v. 3-phase motors. Each type is represented by a colored section of disk. Using the proper disk segment, set for horsepower, the following data can be read: circuit switch starting fuse, conduit size, wire size, necessary running protection, and full load amperes. Square D Co., 6060 Rivard St., Detroit, Mich.

Rubber Industry in America

OHIO

The Barr Rubber Products Co., manufacturer of dipped and molded rubber goods, Sandusky, though shocked by the sudden death of its president, Nelt Barr, intends to carry on his work just as he had planned. The company has been extremely fortunate in having a strong, well developed sales and technical organization, built up during Mr. Barr's management. This organization, which is headed by R. J. Dorn, H. I. Scott, and John J. Lee, will continue uninterruptedly in the aggressive plans which were being developed for the company's business. The firm reports also a strong financial position.

The B. F. Goodrich Co., Akron recognizing the ever-growing tendency toward higher engine speeds in the automobile industry, which leaders of the field have been stressing several years, has just developed a new high speed fan belt that has passed every rigid test up to 5,000 r.p.m. To produce this belt, which is revolutionary when compared to former slower speed belts, a new dynamometer set and an entire new line of machines had to be designed according to Vice President J. H. Connors.

Low pressure automotive tires introduced in February by Goodrich will be known as "Flying Silvertowns," company officials have decided. The new type of tires, for use on lightweight cars, carries 15 pounds' air pressure.

Paul R. Wineman, assistant to C. F. Conner, Goodrich vice president and general manager of mechanical goods sales, recently left for Kansas City, Mo., to become assistant to George Hamm, district mechanical goods manager.

William M. Welch, vice president and general manager, Akron Rubber Reclaiming Co., Barberton, about April 1 will go to St. Louis, Mo., to assume similar duties with the Midwest Rubber Reclaiming Co., E. St. Louis, Ill., an affiliated organization. Mr. Welch will divide his time between St. Louis and Akron.

Master Tire & Rubber Co., Cuyahoga Falls, controlling the Falls Rubber Co., and the Cooper Corp. and the Giant Tire & Rubber Co., both of Findlay, held a meeting of stockholders on March 12 at which the following officers were elected: I. J. Cooper, chairman of the board; R. P. Bremer, president; S. C. Millhoff, vice president; W. P. Cline, vice president and treasurer; J. F. Schaefer, secretary; G. W. Lishawa, assistant secretary; and F. M. Shadley, comptroller. Directors include, besides the officers, J. B. Firestone, Frank C. Millhoff, W. G. Lerch, R. L. Kryder, and C. E. Hart.

Committee D-11, A. S. T. M.

Committee D-11 on Rubber Products, of the American Society for Testing Materials, at its meeting in Cleveland on March 8 received reports from several subcommittees recommending revisions in present standards. A Symposium on Rubber was held March 9 as a part of the Cleveland Regional Meeting of the Society.

The Subcommittee on Mechanical Rubber Hose voted to instruct one of its sections to undertake the preparation of separate specifications and test methods for braided hose and for wrapped hose but not to include fire hose. The new specifications will replace existing standard specifications for individual types of hose, including Standard Specifications for Braided Air Hose for Use with Pneumatic Tools (D 60-24), Standard Specifications for Wrapped Cold Water Hose (D 177-24), and Standard Specifications for Wrapped Air Hose for Use with Pneumatic Tools (D 46-24).

The committee recommended the withdrawal of the procedure for chemical analysis of rubber products appearing in the Standard Methods of Testing Rubber Products (D 15-24), standard since 1924.

A performance specification for rubber compound for wire and cable has been prepared, including methods of accelerated aging and physical tests of insulation. New tentative specifications covering rubber insulating tape suitable for insulating joints in electric wires and cables and for other insulating purposes were accepted by the committee to replace the present tentative specifications. A complete revision of the standard specifications for friction tape for general use for electrical purposes has also been prepared to replace the standard specifications which will be withdrawn.

The Subcommittee on Protection of Persons from Electric Shock has in preparation specifications for linemen's blankets. The Subcommittee on Packings, Gaskets, and Pump Valves is being reorganized with a view to securing more general representation of all interests concerned with rubber products of this type.

Subcommittee on Life Tests for Rubber Products presented to the committee an extensive report giving results of a three year test program and a section was appointed to correlate these results. The Life Test Subcommittee has also undertaken a schedule of tests on a single compound using unaged samples cured in one laboratory and distributed for test purposes to twelve cooperating laboratories.

The Subcommittee on Rubber Products for Absorbing Vibration appointed sections to investigate the adhesion of rubber to metals and also to determine the range of hardness of rubber. This subcommittee also will prepare a method for testing cold flow of rubber. The new subcommittee recently appointed on Dynamic Fatigue Testing for Rubber Products has appointed 2 sections to undertake studies in this field.

At the dinner in the evening a short address on the importance of testing was given by F. O. Clements, technical director, General Motors Research Laboratories, and A. S. T. M. president. Karl Arnstein, vice president, Goodyear-Zeppelin Corp., prepared an address which was delivered by an associate. The author raised the question, "Why are not commercial airships being operated over all oceans?" The answer is that it is necessary to establish international airship lines only on a broad basis and therefore with large funds. This authority expressed his opinion as follows:

"There is no doubt in my mind that transoceanic lines will be started, if proper legislation permits, as soon as the present economic depression has been put behind us, and I feel certain that this will mean an extensive use of large rigid airships of the Zeppelin type."

Officers of Committee D-11 on Rubber Products are, acting chairman: C. R. Boggs, vice president, Simplex Wire & Cable Co.; secretary: Arthur W. Carpenter, The B. F. Goodrich Co.

American Society for Testing Materials members in the Detroit District and the Detroit Chapters of Automotive Engineers and American Society for Steel Treating held a joint meeting at the Hotel Fort Shelby on March 28, 1932. Among the papers read was Service Testing of Automobile Tires by S. M. Cadwell, in charge of Tire Development, U. S. Rubber Co.

The Oak Rubber Co., Ravenna, now manufactures Hy-Tex balloons from pure latex by the patented Anode process.

Eclat Rubber Co., Cuyahoga Falls, stockholders at a meeting on March 15 elected the following officers: C. E. Reiss, president and treasurer; A. E. Holmes, vice president; J. E. Smith, secretary; and Harry C. Allyn, director of sales. Elected to the directorate to replace Dr. J. R. Shoemaker and S. W. Sweet were Mr. Allyn and H. M. Wernig. President Reiss, in giving a satisfactory report for the year to the stockholders, stated that the company's 1931 business was 60% greater in dollar volume, despite reduced prices and depressed conditions than in 1928, 1929, and 1930. During the depression not one employe has been laid off nor has a general wage cut been made.

MIDWEST

Rubber Section, N. S. C.

The Rubber Section of the National Safety Council, 20 N. Wacker Dr., Chicago, Ill., will hold its annual congress in Washington, D. C., October 3 to 7, with headquarters at the Wardman Park Hotel. Work on the program must begin immediately; so all members are asked to cooperate at once.

The Executive Committee of the Rubber Section held a meeting in Buffalo, N. Y., February 18 and 19. The entire program was planned by J. Kerrigan, of the U. S. Rubber Reclaiming Co., Buffalo. The first morning representatives from the U. S. Rubber, Firestone, Goodyear, Goodrich, Pennsylvania Rubber, and Hewitt-Gutta Percha rubber companies were guests of W. H. McKay, of the Dunlop Tire & Rubber Co., Tonawanda, N. Y., who took them through the entire plant. In the afternoon a meeting was held in his office, when a program for the coming annual congress was drafted. At the meeting the resignation of C. L. Hungerford, of the Firestone Tire & Rubber Co., who is leaving safety work for another division of that company, as general chairman of the N. S. C. Rubber Section was accepted; and Vice Chairman J. R. Hanson, of the United States Rubber Co., was elected to fill the vacancy for the remainder of this year. On Thursday evening a well-attended dinner was held, marked by interesting speeches on safety, and excellent entertainment.

The next day the committee convened in the Hewitt-Gutta Percha offices to discuss 25 safety subjects pertinent to the rubber industry. E. K. Twombly, of the Hewitt company, was luncheon host to the gathering, which later went sight-seeing into Canada.

Chicago Rubber Clothing Co., Racine, Wis., through General Manager F. F. Sommers, Jr., has announced that this year the company is celebrating its fiftieth anniversary, for in 1882 it was founded at Chicago Heights, Ill. Four years later the factory was moved to the present site in Racine. The plant originally was operated by steam and later electrified. E. C. Woods, formerly at Racine, now has his headquarters at the firm's St. Louis, Mo., office in the Silk Exchange Bldg., in conjunction with the company's Southwest representative, John D'Arcy. Sales Manager Robert Watt, previously in New York, now is established at the factory, handling the sales and sales promotion work and at the same time contacting accounts in the East.

The Third Joint Trade Show of the Motor & Equipment Manufacturers Assn. and the National Standard Parts Assn. will be held in Detroit, Mich., during the week of December 5. While the show is officially sponsored by these 2 organizations, the Motor & Equipment Wholesalers Assn. will participate in it through its representation on the M.E.M.A. committees. Each of the 3 associations will hold its annual convention in connection with the show, either immediately prior to the show or during the early part of the week.

Baldwin Rubber Co., Pontiac, Mich., now also manufactures a wool faced rubber flooring for automobiles. The flooring, however, is said to have exceptional merit as a general floor covering too. Western Felt Works, 4029-4133 Ogden Ave., Chicago, Ill., is distributer. O. W. Patterson is sales manager of its Westfelt Division.

Essex Wire Corp., 37 Manchester Ave., Detroit, Mich., recently acquired the New York Insulated Wire Co., Wallingford, Conn., which, however, will continue as a separate organization and will operate without change just as it has in the past. In acquiring the New York Insulated company the Essex organization now has a complete line of wire products and combined assets approximating $3,000,000. Addison E. Holton is Essex president, and H. A. Strickland, vice president.

NEW JERSEY

Very little change occurred in the rubber situation in New Jersey during the past month. Production remains the same at some plants; while a little increase took place at others. Some factories working on automotive production continue busy. Rubber footwear also shows a gain because of weather conditions. Although there has been talk of increasing tire prices in the western factories, New Jersey manufacturers do not believe there will be any change in this state at this time.

Joseph Stokes Rubber Co., Trenton, reports increased business over that of the previous month and very bright spring prospects.

Essex Rubber Co., Trenton, is busy on its annual output of rubber mats for the Ford Motor Co., Detroit, Mich. This is an order Essex has been filling for years. Barclay L. Stokes, who for many years was the Essex chief bookkeeper recently celebrated his eighty-fourth birthday.

James P. Flynn, general manager of the Puritan Rubber Co., Trenton, has been spending a month looking after business interests in the West and Far West. The Puritan company reports that business has dropped off a little, but this decline is expected at this time of the year.

The Thermoid Company, Trenton, continues its night force to fill orders for the automotive trade.

Pocono Rubber Cloth Co., Trenton, operating normally, expects an increase in business as the automobile industry improves.

William H. Sayen, president of the Mercer Rubber Co., Hamilton Square, has been through the Midwest on business.

Whitehead Bros. Rubber Co., Trenton, continues to operate near normal capacity. The company is also busy in its rubber shoe department.

Pierce Roberts Rubber Co., Trenton, has experienced no change in business during the past month.

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, through J. J. DeMario, director of publicity, has announced that its factory won the highest merit award in its group, including rubber, linoleum, and kindred industries, in the 13-week Fourth Annual State-Wide Interplant Safety Contest conducted by the State of New Jersey Department of Labor. D. Repony, chemist on the company's research staff, has written a pamphlet, "When and How Will We Get Out of This Depression."

Alfred H. Branham, vice president and receiver of the Murray Rubber Co., Trenton, has been through the South on business. There has been no change in tire production during the month.

Hamilton Rubber Mfg. Co., Trenton, suffered a loss of several thousand dollars on March 10 when flames destroyed a three-story frame portion of the plant and a large quantity of scrap rubber. The blaze started in a huge pile of scrap and, fanned by a stiff wind, was communicated to the plant. Water from the sprinkling system likewise damaged stock and put the company's motors out of commission. The firm states that no men will be laid off as a result of the fire. Henry N. Young, Hamilton vice president, has been spending some time in Bermuda with his family.

The Norwood Tire Co., Long Branch, recently played host to 450 representatives of the automotive industry, including repairmen and car dealers at the first of a series of illustrated lectures on shop profits. The lecture was given by Thomas Dugan, merchandising director of the Thompson Products, Inc. Attendance prizes were distributed among the delegations.

Rubber Manufacturers' Association of New Jersey held a meeting early in March in the Trenton Club, Trenton, when a general discussion of the rubber situation took place. Manufacturers said they believed business would take an upward trend in early summer.

Luzerne Rubber Co., Trenton, reports that business has improved somewhat during the past few weeks.

R. J. Bonstein, with the Thiokol Corp., Yardville, for 2 years and prior to that time with the Development Department of the Seiberling Rubber Co., effective March 31 resigned from the Thiokol Corp. He has not yet disclosed his future plans.

H. M. Royal, Inc., Oakland and Norman Aves., Trenton, supplies to the trade compounding ingredients and specialties, corrugated containers, and gummed tape.

NEW ENGLAND

Godfrey L. Cabot, Inc., 940 Old South Bldg., Boston, Mass., has appointed The Rolls Chemical Co., Buffalo, N. Y., its representative for the sale of all grades of Cabot carbon black in upper New York State. Cabot has also designated P. N. Soden & Co., Ltd., Montreal, P. Q., Canada, its representative in Ontario. Through these appointments users of blacks in these areas will receive closer and more careful fulfillment of their requirements than ever.

Caldwell & Atwood Rubber Products, Inc., Whitman, Mass., manufactures molded and plastic rubber products, such as specialties for general household and office use, and also molded parts for manufacturers. James R. Caldwell, who is president, was with The Seamless Rubber Co., New Haven, Conn., for 11 years as factory manager and vice president and for the past 2 years was manager of the molding division of the C. F. Church Mfg. Co., Monson, Mass. Secretary-Treasurer Gordon E. Atwood for a number of years was with the T. A. D. Jones Co., New Haven.

W. S. Libbey Co., Lewiston, Me., manufacturer of Golden Fleece Blankets, through Joseph M. Lurie has announced that it is just starting in the rubber coating and saturating business and is manufacturing a newly developed rubber product using a blanket base. Officers are Alla A. Libbey, president; Wm. Deacon, Jr., vice president; W. Scott Libbey, treasurer; and Wm. G. Tackaberry, assistant treasurer. The company maintains a sales office at 44 Worth St., New York, N. Y.

Samuel W. Aronson has withdrawn his name in any connection with the Washington Raincoat Co., Boston, Mass.

The Fisk Tire Co. last month held a meeting of its Boston dealers at which Thomas Hogan, president of the local company bearing his name, outlined the selling plans for the 1932 season. An extensive advertising campaign is planned, and details were given by James A. Silin, of the Chamber & Wiswell Advertising Agency, handling the account. Following a luncheon at the Hotel Lenox the gathering was addressed by W. Whiting, service manager of the Fisk Rubber Co., and others.

The New England Tire Co. recently leased the store and basement at 876 Commonwealth Ave., Boston, Mass., where it will shortly open for business.

The National Rubber Co., 29 Lincoln St., Boston, Mass., according to a recent announcement is now controlled by the Jacobs Leather Co.

The Norwalk Tire & Rubber Co., Inc., Norwalk, Conn., recently announced that its sales for January, 1932, showed 100% increase over those for the same period in 1931; while sales for February, 1932, increased 75% over those for February, 1931.

Nelson W. Pickering

Farrel-Birmingham Co., Inc., stockholders held their annual meeting at the company's main office, Ansonia, Conn., on February 18, when the following directors were reelected: Charles F. Bliss, Henry F. Wanning, Franklin Farrel, Jr., Nelson W. Pickering, Alton Farrel, David R. Bowen, Carl Hitchcock, Franklin R. Hoadley, Armin G. Kessler, Walter Perry, Julius G. Day, Fernley H. Banbury, William B. Marvin, Edward H. Green, William A. Gordon, Alton A. Cheney, and George C. Bryant. Following the shareholders' meeting the directors met to reelect all officers as follows: Franklin Farrel, Jr., chairman of the board of directors; Nelson W. Pickering, president; David R. Bowen, Carl Hitchcock, Franklin R. Hoadley, and Armin G. Kessler, vice presidents; Alton Farrel, treasurer; Frederick M. Drew, Jr., and Laurie K. Blackman, assistant treasurers; George C. Bryant, secretary; and William B. Marvin, assistant secretary.

President Pickering has been identified with the company and its predecessor, the Farrel Foundry & Machine Co., during all his civilian career. He was born in Cambridge, Mass., April 7, 1887, and attended schools in Roxbury. Then he was appointed to the United States Naval Academy. Upon his graduation he embarked upon a naval career in ordnance engineering. During the War he was associated with Franklin Farrel, Jr., who eventually induced him to resign from the Navy to join the Farrel company. In November, 1919, Mr. Pickering started work in the Roll Department and became assistant manager, then manager of the department. In February, 1930, he was elected to the presidency.

The Plymouth Rubber Co., Plymouth, Mass., is planning an expansion in the near future.

United States Rubber Co. expects to increase activities at its Naugatuck, Conn., plant. The tennis shoe department last month began operating 4 days a week. The company states that if present business trends continue, even larger production on boots and lumbermen's shoes may be scheduled. Business in the sundries department is reported excellent, but in the general products department no immediate change is in sight.

The B. F. Goodrich Rubber Co., at a special sales meeting at the Hotel Bradford, Boston, Mass., held its first showing of the new colored tires before a gathering of over 500 New England dealers. The morning session was presided over by Philip J. Kelly, assistant general sales manager. In the afternoon the Goodrich Akron staff gave "The Play Without A Name." At the business session H. W. Delzell, technical engineer, talked on "Production;" Mr. Kelly, on "Product Innovations;" Guy Gundaker, sales promotion manager, on "Advertising and Merchandising;" and L. L. Black, New England district sales manager, on "Products We Manufacture."

The Hood Rubber Co., Watertown, Mass. Two of its employes won prizes at the 2 essay contests under the supervision of the Boston chapter of the National Association of Cost Accountants. James F. Cullen, manager of budgets, received first prize in the first contest, and Alden C. Brett, controller, won third prize in the second contest. The awards were checks and subscriptions to professional magazines.

Bolta Rubber Co., Inc., 151 Canal St., Lawrence, Mass., manufactures hard rubber combs. Officers are John Bolten, president and treasurer; Harold Houston, vice president; and Ernest Halbach, secretary.

The National Football Rules Committee at its recent meeting in Hanover, N. H., in its modification of the playing code concerning equipment states that if hard and unyielding substances are used, they must be padded on the outside with felt, foam rubber, or other soft padding at least 3/8-inch thick.

Stowe & Woodward, Newton Upper Falls, has absorbed the Arlington Rubber Co., Dorchester, both in Mass., and the new organization will be known as Stowe-Woodward, Inc. The manufacture of golf balls, in which the Arlington company was engaged, will be conducted as a separate department, and for the time being, at least, the plant in Dorchester will continue operations. H. B. Shepard has entire charge of both manufacturing and sales. He states that a new dollar grade golf ball with a center core only 5/8-inch in diameter, to be known as the Dorchester, will be brought out this season. It is designed for professional and expert golfers who want the utmost distance and accuracy.

Heveatex Corp., 67 Maplewood St., Malden, Mass., with branches at 50 Broad St., New York, N. Y., Ohio Bldg., Akron, O., and First National Bank Bldg., Chicago, Ill., supplies normal, concentrated, and processed latex for all industrial requirements and also imports certain selected grades of crude rubber. Executives are President James B. Crockett, Secretary Phillip Coyle, and Treasurer B. F. Hartwell.

The Union Blacking Co., Inc., 761 Washington St., Lynn, Mass., supplies to the shoe manufacturer adhesives, finishes, repairers, etc. Officers are John J. Nestor, president; Stanley Frier, secretary; and Frederick B. Day, treasurer and purchasing agent.

Colvulc Rubber Co., Inc., now at 11 Fayette St., Norfolk Downs, Boston, Mass., was formerly known as the Hitchcock Co. P. N. Sylvester is manager.

The Alb Rubber Co., Somerville, Mass., owned by Stanley and Goldman, suffered a loss of approximately $4,000 when a recent fire partially destroyed its offices at 71 Union Sq.

New Officers, N. A. W. M. D.

The following officers and directors of the National Association of Waste Material Dealers were elected at the annual meeting held March 16, at the Hotel Astor, New York, N. Y.:

President, George Birkenstein, S. Birkenstein & Sons, Inc., Chicago, Ill.; first vice president, R. W. Phillips, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; second vice president, Geo. V. Bangs, Nassau Smelting & Refining Co., Inc., New York; third vice president, J. V. Spachner, Chicago Mill Paper Stock Co., Chicago; secretary-treasurer, Chas. M. Haskins, New York.

Directors for 2 years: Mr. Bangs, Louis Birkenstein, S. Birkenstein & Sons, Inc., David Charak, Federal Paper Stock Co., St. Louis, Mo.; H. H. Cummings, Wm. H. Cummings & Sons, New York; Ezra Frankel, Frankel Bros. & Co., Rochester, N. Y.; Benjamin Friedman, Benjamin Friedman, Hammond, Ind.; Harry S. Goldstein, L. Goldstein's Sons, Philadelphia, Pa.; David Golub, Charles Harley Co., San Francisco, Calif.; Maurice Goldstein, R. Goldstein & Son, Inc., New York; A. T. Hicks, Daniel M. Hicks, Inc., New York; J. S. Katz, American Metal Co., Ltd., New York; J. M. Maher, Pennsylvania Wood & Iron Co., Buffalo, N. Y.; Julius Muehlstein, H. Muehlstein & Co., Inc., New York; J. W. Paterson, Hudson Smelting & Refining Co., Newark, N. J.; and Mr. Phillips.

The Scrap Rubber Division met on March 16. Julius Muehlstein presided in the absence of Herman Muehlstein, chairman of the division. A committee comprising Nat E. Berzen, Julius Muehlstein, and J. A. Goldblatt was appointed to confer with the Rubber Reclaimers Association Committee on changes in the Scrap Rubber Classification. Mr. Berzen was unanimously elected chairman for the ensuing year.

EASTERN AND SOUTHERN

Latex Fiber Industries, Inc.

The United States Rubber Co. has announced the formation of the Latex Fiber Industries, Inc., a new company owned jointly by the United States Rubber Co. and the J. P. Lewis Co. interests of Beaver Falls, N. Y. The latter group is one of the largest and most prominent manufacturers of special paper board products.

Products now manufactured by the Fiber Products Division of the United States Rubber Co., at Cleveland, O., and Rock City Falls, N. Y., will be produced by the new company at Beaver Falls, N. Y., in the Lewis, Slocum & LeFevre Co., Inc., plant, acquired for that purpose to be ready for production by June 1. Meanwhile customers will be served from the Cleveland and Rock City Falls plants of the United States Rubber Co. These products, namely, Insolex and Laflex, used in the shoe industry; Lexide, a base material used by manufacturers of artificial leather goods; and various automotive specialties such as panel and fireproof boards, will continue to be marketed through the sales organization of the United States Rubber Co. It is planned to manufacture, also, a line of specialties for general purposes such as cover, tag, and sign paper and various industrial paper and paper boards. These products will be marketed by the J. P. Lewis Co. through its present selling organization.

Latex Fiber Industries, Inc., has been licensed under many patents pertaining to the use of latex and fibrous materials owned by the United States Rubber Co. and is in a position to grant sub-licenses to paper and paper board manufacturers. It is planned to extend development work on many new types of products made from combinations of latex and fibrous materials, particularly paper manufacturing.

Officers of the new company are: Harry S. Lewis, president; R. P. Rose, vice president; Wilson H. Blackwell, treasurer; D. E. Griffith, secretary; directors: Harry S. Lewis, R. P. Rose, and H. W. Waite. Mr. Lewis is president of the J. P. Lewis Co. and Mr. Griffith also represents that company. Messrs. Blackwell, Rose, and Waite are members of the United States Rubber Co. organization. The company will have offices at 1790 Broadway, New York, and Beaver Falls.

Westmoreland Products Co., Mahoning Ave. and Hobart St., New Castle, Pa., manufacturers red oxide of iron. Officers include Stewart P. Foltz, president; John S. Crowl, vice president; Arthur M. Brown, secretary-treasurer; and J. Walter Green, purchasing agent.

Woodworth Specialties Co., 121-25 Montgomery St., Binghamton, N. Y., manufactures Easy On and Handichain tire chains and Woodworth fender flaps, spring covers, and chain tighteners. F. A. Woodworth is owner, and C. B. Woodworth, manager.

The Monroe Sander Corp., 39-25-21st St., Long Island City, N. Y., has announced that Carl Fichandler, chief chemist, and Charles Dearborn, vice president, both of the Republic Varnish Co., have resigned those positions to join its staff in similar capacities. They will concentrate on the sale and the development of topping varnishes and leatherette lacquers.

McClaren Rubber Co., Charlotte, N. C., recently reorganized, held its annual stockholders' meeting on February 17, which was followed by a meeting of the board of directors at which Irving Eisbrouch, vice president and general manager of the old firm and one of the incorporators of the new organization, was elected president.

Clarence P. Harris, industrial chemist, formerly at 522 Fifth Ave., has announced the removal of his office and the establishment of a newly equipped laboratory at 174 Madison Ave., New York, N. Y.

Carpenter Container Co., Inc., 147-41st St., Brooklyn, N. Y., manufactures fiber drums specially treated to hold liquid latex or rubber cement in bulk in units of 5, 10, 15, and 30 gallons. Officers are Herbert L. Carpenter, president; Wm. O. Carpenter, vice president and purchasing agent; Henry Craemer, secretary; and H. S. Kimball, treasurer. Branches are Philadelphia-Carpenter Container Co., 2150 E. Huntingdon St., Philadelphia, Pa.; Buffalo-Carpenter Container Co., 1200 Niagara St., Buffalo, N. Y.; and Emery-Carpenter Container Co., 615 W. Pershing Rd., Chicago, Ill.

Clarence H. Low, well known in the crude rubber trade, is chairman of the clothing division of the Emergency Unemployment Relief Committee with headquarters at 73 Dey St., New York, N. Y. He asks for donations of shoes and clothes.

"Economic recovery means permanent jobs for the unemployed. Conversely, every permanent job which is found hastens a return to a normal economic order. Hundreds of unemployed men and women might get jobs if they had presentable clothing. But they have not, and have no money to buy any."

Kelly Springfield Tire Co., Cumberland, Md., at a meeting of the board on March 15 elected President William H. Lalley president and treasurer. Other officers elected were: Matthew B. Muxen, chairman of the board; Louis Mueller, first vice president; Herbert B. Delapierre, secretary and assistant treasurer; E. G. Roff, assistant secretary. Members of the executive committees include: Chairman J. K. Newman, W. M. Flook, John M. Hancock, Frank Wilbur Main, Mr. Mueller, and Mr. Muxen. Beginning March 20, 9:45 p. m., E.S.T., over WJZ and associated stations, the company will sponsor a series of new radio sketches, "Making the Movies with Raymond Knight."

OBITUARY

H. M. Thomas

WITH deepest regret we announce the sudden death, caused by unsuspected heart trouble, on March 7, of Harry M. Thomas, 46, production manager of the Hazard Insulated Wire Works, division of The Okonite Co., Wilkes-Barre, Pa. Starting at the age of 16 as a laborer in the wire mill of the old Hazard Mfg. Co., by diligence and ability he made his way forward until he had reached the position of superintendent of the Insulated Wire Division, when in January, 1928, this department of the original Hazard enterprise was purchased by The Okonite Co., which made him production manager.

His funeral was largely attended, and a long procession followed to his interment. Mr. Thomas had no other interests than his family and his work, and he lived for both. Surviving are his widow and two daughters.

A. P. Hodgman

ALFRED PURDY HODGMAN, 34, son of George B. Hodgman, died at Mt. Sinai Hospital, New York, N. Y., on March 14 after a short illness. The deceased left his class in 1917 at Yale to join the Ambulance Division of the French Army; then entered the American troops upon their arrival. He served with distinction during the War and was decorated. He belonged to the Yale and the American Yacht clubs.

Surviving are his parents, his widow, and a son.

Popular Executive

A COLD contracted while he attended the Toy Fair in New York, which later developed into bronchial pneumonia, led to the sudden and widely mourned death, on February 20, of Nelt Barr, president of The Barr Rubber Products Co., manufacturer of dipped and molded rubber goods, Sandusky, O., and Sandusky City Commissioner.

Mr. Barr was born in Windsor, O., April 24, 1882, and was educated in the Ashland, O., public schools, where his family later moved.

His first work was traveling for the M. J. Averbeck Jewelry Co., New York, N. Y., with which firm he remained until 1907. Then he went into the jewelry business for himself in Ashland until 1917, when he became production manager of The Faultless Rubber Co., Ashland. He resigned the next year, however, to open an optical store, which lasted 2 years.

In 1909 he won the election as Ashland treasurer. He served 2 full terms of 2 years each as city treasurer and as treasurer of the Ashland school district.

He organized the rubber company that bears his name in 1920 in Lorain, O., and was its only president. In 1923 the firm moved to Sandusky.

The deceased belonged to Ashland Lodge, 151, Free and Accepted Masons,

Nelt Barr

Ashland Chapter, 67, Royal Arch Masons, Ashland Elks, Sandusky Lodge of Moose, Sandusky Aerie of Eagles 444, and Sandusky Lodge, Knights of Pythias.

Surviving are his parents, his widow, one son, and 2 daughters.

Funeral services were held at his home on February 23 in the morning. Then the cortege went to Ashland, his former home, where services were conducted in Trinity Lutheran Church. Burial was in the Ashland cemetery.

Crude Rubber Man

ARTHUR JONES, president of the General Rubber Co., died on February 26 at his home in London, England. His passing was unexpected, for a letter received at the company offices in New York the day before his death stated that he was recovering satisfactorily from an attack of pneumonia.

Mr. Jones was one of the best known

Underwood & Underwood Studios

Arthur Jones

men in the crude rubber circles of Great Britain and the Continent. He had served also as chairman of the Rubber Trade Association. He first became associated with the General Rubber Co. in 1907, as manager of the Liverpool office. In 1927 he became managing director of the General Rubber Co., Ltd., of London. He was elected president of the General Rubber Co. in 1930 and, though continuing as head of the organization in London, made frequent visits to the company's headquarters in New York. The deceased was a man of wide experience in all phases of the rubber industry and traveled extensively to the rubber plantation districts of the Far East.

Frederick Morgan

ON MARCH 6 Frederick Morgan, 67, for the past 4 years receiving clerk of the Puritan Rubber Co., Trenton, N. J., dropped dead at his home, 21 Lincoln Ave., Trenton, from heart trouble. He had been employed by rubber companies for many years, including the Home Rubber Co. and other Trenton firms.

Mr. Morgan is survived by one daughter and a brother. Burial was in Riverview Cemetery, Trenton.

Hugh A. McKellar

HUGH A. McKELLAR, for 4 years Los Angeles sales branch manager for the Firestone Tire & Rubber Co., was burned to death Saturday evening, March 19, when the airplane in which he was a passenger fell in San Gorgonio Pass, near Redlands, Calif., and was destroyed together with 7 occupants.

Mr. McKellar was one of the most expert distributers in the Firestone service. He joined the company in 1914 as a field salesman in the truck tire department in New York, N. Y.; later he conducted the salesmen's training school at the Firestone plant in Akron, O.; and then became a branch manager in Buffalo, Albany, Detroit, and Los Angeles.

He leaves a widow and two children. The funeral took place March 23. Rites were conducted at Reed Bros. mortuary, and the body was taken to Forest Lawn Cemetery, Glendale, Calif.

Baron Takuma Dan, recently assassinated leading financier and industrialist of Japan, was managing director of Mitsui Gomei Kaisha, Tokio, foremost Japanese commercial enterprise and importer of crude rubber.

Shiraishi Kogyo Kaisha, Ltd., Kuwana, Mie-Ken, with branches in Tokio and Osaka, Japan, are manufacturers of a specially processed native colloidal calcium carbonate known as Hakuenka. This material is prepared in several characteristic grades to meet various compounding conditions. Hakuenka has remarkable dispersive ability and is well adapted for use with all colors.

CANADA

A recent survey conducted by the Canadian Bank of Commerce, Toronto, Ont., covering 25 industrial centers, revealed rubber goods were making the best showing of 6 representative lines. Rubber goods production was 91% of normal, wearing apparel 75%, and textiles 73%. A number of mills and factories were operating at capacity and a few overtime.

The demand for rubber mats in attractive designs and colors is improving; so dealers are taking in a fresh stock for spring business. Prices on these mats are much lower than when they were first introduced.

Manufacturers now are delivering booked orders of garden hose. From some parts booking is described as good; while in others a heavy carry-over limited orders. Prices quoted at the time bookings started last fall, showing reductions from 1931 prices, are unchanged to date.

There is little demand for tires, according to Toronto manufacturers, although it was to be expected that the fine weather experienced this winter would have increased the ordinary seasonal demand. There are apparently no immediate indications of price changes. Present prices on passenger automobile tires have remained unchanged since early in 1931.

The rubber footwear placing season opened March 14. The new samples show a tendency toward concentration. Fussy patterns and novelty colors are noticeably absent, excepting the best sellers, and manufacturers are avoiding carry-overs of obsolete stocks resulting from the unusually mild winter. Altogether prospects are for a healthier condition in the rubber industry than has existed for a considerable time. The experience of the past season proves very conclusively that the women of Canada like fur-trimmed velvet overshoes; so it looks as if they will be the vogue again next season. This season prices were more or less indiscriminately leveled out. Next season fur-trimmed boots may be expected to be priced relatively higher. The carriage boots were featured by most manufacturers in 7- and 9-inch heights; the higher ones sold much more freely. Ordinary fabric overshoes were more or less eclipsed by the velvets, but rubber rain boots sold in goodly volume. Both blacks and browns were in demand, with the former as the better seller. Slide fasteners are reported by some manufacturers to be slipping fast partly because they are more expensive. The novelty ankle-height rubber of the splasher type appears to have sold fairly well, but not in such quantities as to indicate that it is superseding the practical rain boot, which is ever popular.

Under the caption "Brass Tacks" the *Montreal Star* commented editorially on the annual address of C. H. Carlisle, president and general manager of the Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont. He spoke straight to the point on the forthcoming Imperial Economic Conference. He rammed home the need of more preparation by Canadians. Canada must make up its mind, in detail, what it can offer, no less than what it will seek, he declared. Coming down to brass tacks, Mr. Carlisle said that his own industry, for example, could well buy all of its rubber and much of its cotton and chemicals within the Empire.

"Canada can buy chemicals to her profit and advantage which she is now purchasing from the United States. I am thoroughly in favor of Empire trade."

W. H. Miner, president of the Miner Rubber Co., Ltd., Granby, P. Q., and of the Canadian Manufacturers' Association, attended the Toronto meeting of the latter body after a visit to Great Britain during which he conferred with members of the National Government as well as with officials of various organizations which are preparing for the forthcoming Imperial Economic Conference in Ottawa.

Essex Wire Corp., Detroit, Mich., U. S. A., maker of insulated wire of all kinds, has leased property in E. Windsor, Ont., and is preparing to open a Canadian plant at an early date, which will employ between 50 and 60 workers. L. C. Bookout has been appointed Canadian manager.

Dominion Rubber Co., Ltd., Montreal, P. Q. The Lucky Shoe, latest member of the Fleet Foot family, engraved with four-leafed clover horseshoes and swastikas. It is said to give foot comfort and smart style unusual in a shoe so sturdily built. The Lucky is made with white or brown duck uppers, the white with black rubber eyelet facings, instep strap, and back stay; brown carries suntan trim, foxing, and outsole, made in men's and boys' sizes.

J. E. Tussaud, formerly with the Dominion company for 19 years, recently joined the sales staff of the Asbestonos Corp., Ltd., St. Lambert, Montreal, as representative. He will cover Eastern Canada from Kingston to Halifax, N. S.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., service men from coast to coast attended a company convention in Toronto recently, during which they inspected the factory at New Toronto. They were entertained at a banquet in the Royal York Hotel.

Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont. Attended by dealers and salesmen from all parts of Canada, the Firestone Champions' convention was held at Hamilton, where they were welcomed by President E. W. BeSaw. Apart from visits to the factory, the party enjoyed a round of functions and entertainments, attended a theater performance and a hockey game, and had a side trip to Niagara Falls. The visitors comprised one dealer and one salesman from each province in a country-wide sales competition. Each was presented with trophies; while the 2 grand champions, A. Casavant, Waterloo, P. Q., and Clen Huxtable, from British Columbia, were awarded trips to Bermuda.

Gutta Percha & Rubber, Ltd., Toronto, Ont., through Secretary Harold D. Warren, has announced that Treasurer F. A. Warren has been also elected president to fill the vacancy caused by the death of the late president, Charles Newton Candee. Owing to the resignation of Managing Director J. Herbert Coffee, Jr., effective April 1, 1932, President Warren will assume those duties also. These changes will in no way affect the affairs and the general policy of the company, which will be continued as heretofore.

Mrs. Anna P. Candee and Charles Newton Candee, Jr., are applying for probate of the will of the late Mr. Candee, who died January 13, leaving an estate valued at $107,895.70 as follows: cash, $7,580.72; mortgages, $3,810.05; promissory notes, $7,054.09; stocks, $37,576; insurance, $51,654.84; and miscellaneous, $220.

General Tire Corp. of Canada, Ltd., Oakville, Ont., manufactures automobile tires. Frank Law is president; James G. Merrick, secretary; and Leonard W. Law, treasurer and purchasing agent.

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malaya House, 57 Charing Cross, London, S.W.1, England, gives the following figures for February, 1932:

Rubber Exports

Ocean Shipments from Singapore, Penang, Malacca, and Port Swettenham

	February, 1932	
To	Sheet and Crepe Rubber Tons	Latex Concentrated Latex and Revertex Tons
United Kingdom	5,527	95
United States	26,131	125
Continent of Europe	4,113	97
British possessions	1,239	...
Japan	4,227	4
Other countries	449	1
Totals	41,686	322

Rubber Imports

Actual Imports by Land and Sea

	February, 1932	
From	Dry Rubber Tons	Wet Rubber Tons
Sumatra	477	3,453
Dutch Borneo	234	1,686
Java and other Dutch Islands	122	98
Sarawak	678	18
British Borneo	208	32
Burma	286	16
Siam	146	188
French Indo-China	263	27
Other countries	66	10
Totals	2,480	5,528

FINANCIAL

Intercontinental Rubber Co.

To THE STOCKHOLDERS: The year 1931 again broke all previous low price records for crude rubber of every class. There were no substantial rallies, and the average New York price for standard ribbed smoked sheet for the 12 months under review was 6.17¢ per pound or approximately half the average price of the year previous which in turn was half that of 1929. The price at December 31, 1931 was 4-15/16¢ per pound, and attention is called to the item of $29,585.33 set up as a reserve to cover the difference between said price and the cost of our plantation rubber inventory.

During the early part of the year a commercial guayule rubber extraction unit was completed near Salinas, Calif., but was operated only for a short time for test and demonstration purposes, the resulting output being 270,000 pounds of dry "Ampar" rubber which proved the excellent quality of the cultivated shrub grown by our California subsidiary in that vicinity without irrigation. As anticipated, the percentage of rubber extracted was higher than anything hitherto secured from wild shrub in Mexico, but under existing conditions of price and oversupply, harvesting of additional mature areas and the planting of new areas are being held in abeyance. At present, and for some time past, profitable production of crude rubber has been impossible anywhere in the world, and our future policy with reference to this California enterprise will depend on market as well as other developments and considerations.

We did not increase the tapped area of the Sumatra estate nor will we do so during 1932. The output was 1,717,300 pounds with costs steadily declining to very satisfactory levels as compared to those of the average Caucasian producer, but nevertheless showing a substantial loss. Thus far we have continued the care and upkeep of all departments of the estate although effecting all possible economies elsewhere. Our future policy will depend to a considerable extent on the outcome of conferences looking to governmental restriction of output which have again been renewed in The Hague and in London.

Your company is still in good financial position, having current assets of $990,728.69 with no current liabilities other than current drafts and accounts payable aggregating only $32,032.61.

Our guayule rubber factories and the Cedros Hacienda in Mexico were kept on a care and maintenance basis throughout the year. An equitable readjustment of certain of our heavy property tax burdens is in reasonably definite prospect, but there is no probability of operations being renewed until world rubber prices have been satisfactorily adjusted. Meanwhile the shrub ranges have greatly benefited by arrested exploitation and favorable weather.

GEORGE H. CARNAHAN,
President.

Wilmington, Del.,
March 16, 1932.

United States Rubber Co.

To THE STOCKHOLDERS: The year ended December 31, 1931, covered by this report, has been a period of decreased sales and small margins of profit. Every effort has been and is being made to meet the changed conditions.

Operations

Net sales for the year amounted to $114,132,055 after all discounts and allowances. Tires, which were distributed in certain localities by the United States Rubber Co. in previous years, were sold during 1931 by the Samson Tire & Rubber Corp., Los Angeles, Calif., and the Gillette Rubber Co., Eau Claire, Wis., controlled companies. The sales of these companies, amounting to more than $12,000,000, have not been consolidated with those of the United States Rubber Co.

Selling prices of all products have declined, and the quantities sold have been less in many instances. Sales of waterproof footwear and clothing again have been affected by the mild weather, and general business conditions have particularly affected sales of hose, belting, packing, and similar articles to industrial enterprises. Tire sales were higher in dollar value in spite of lower selling prices.

A new elastic yarn has been developed by our research laboratories. This is being marketed under the trade name of "Lastex" for use in the textile and other fields. Its acceptance indicates a wide use.

Profit from operations for the year amounted to $630,858 after interest on funded indebtedness of $4,892,736, but before provision for depreciation of $9,672,924 and net adjustments of $431,338. The charge to surplus for the year amounted to $9,473,404, compared with $18,063,941 for 1930.

Consolidated Balance Sheet

Total current assets were $62,605,970, of which cash amounted to $13,181,029. Total current and accrued liabilities were $7,625,039. The ratio of current assets to current liabilities was 8.21 to 1.

During the year, bonds and notes of the company were bought for future redemption at a difference between par and purchase price which resulted in a credit of $2,034,149. These purchases had an important effect in reducing interest on funded indebtedness from $5,576,791 in 1930 to $4,892,736 in 1931. Total outstanding funded and long term indebtedness was reduced $9,314,353 during the year.

Inventories of raw materials, goods in process of manufacture, and finished goods were adjusted to the lower of cost or market prices of the component raw materials. Also, an adequate contingent reserve is available to reduce commitments to market prices.

Current assets, current liabilities, securities owned, and outstanding bonds of foreign subsidiaries were converted at the rates of exchange prevailing on December 31, 1931.

Miscellaneous securities owned by the company were reduced to market prices where required.

Financial Report of Six Prominent Tire Companies

Company	Year	Funded Debt—s ($1,000,000)	Interest Times Earned	Shs. Pfd. Stock Outstanding (1,000)	Earned Per Sh. Preferred	Shs. Com. Stock Outstanding (1,000)	Earned Per Sh. Common	Com. Divs. Paid Per Sh. Calendar Year	P. & L. Surplus ($1,000,000)	Net Working Capital ($1,000,000)
Firestone	1929-Oc	22.7	N.F.	600	12.83	2240	2.74	1.60e-q	47.5	79.9
Tire	1930-Oc	21.7	N.F.	579	2.66	2155	d	...	33.5	52.2
Rubber	1931-Oc	20.6	N.F.	530	2.11	2115	0.40	1.25	31.4	51.5
Goodrich	1929	33.8	3.6	327	23	1054	4.53	4.00	25.7	59.3
(B. F.) Co.	1930	61.2	d	315	d	1167	d	2.00	8.9	73.1
(The)	1931	62.6	d	310	d	1167	d	None	7.5	61.4
Goodyear	1929	67.7	4.6	796	23	1398	10.23	2.50	26.6	116
Tire &	1930	63.4	3.0	785	13	1417	d	5.00	23.8	105
Rubber Co.	1931	61.0	1.2	767	..	1437	..	3.50	16.1	89
Kelly	1929	None	..	82.1FSP	d	1064	d	None	6.8d	11.5
Springfield	1930	None	..	82.1FSP	d	1064	d	None	10.6d	8.6
Tire Co.	1931	None	..	82.1FSP	d	1064	d	None	11.1d	8.1
Lee	1929-Oc	None	..	None	..	300	1.62	None	1.92	4.4
Rubber &	1930-Oc	t-m	..	None	..	300	d	None	1.12	3.5
Tire	1931-Oc	t-m	..	None	..	300	d	None	0.49	2.9
U. S.	1929	81.2	1.1	651	0.88	1464	d	None	10.6	79.4
Rubber	1930	95.0	d	651	d	1464	d	None	7.1d	72.4
Co.	1931	81.2	d	651	d	1464	d	None	d	62.8(6)

d—Deficit. FSP—1st and 2nd Preferred. s—Including obligations of subsidiaries. t—Negligible amount. m—Including mortgages. (6)—6 Mos. ended June 30.

Manual of The Magazine of Wall Street.

As reported last year, an interest in the Samson Tire & Rubber Corp. and in the Gillette Rubber Co. was acquired early in 1931. These securities, as well as those of several minor companies, are included among the investments of the company.

Properties, plants, and equipment had a net book value on December 31, 1930, of $94,056,883. Capital expenditures amounting to $3,650,705, less sales of properties and disposition of equipment having a book value of $702,966 and provision for depreciation of $9,672,924, caused a net reduction in book value of $6,725,185 for the year. The net book value on December 31, 1931, was $87,331,698.

The instalment due March 19, 1932, of $500,000 on the loan of a subsidiary company was paid prior to the end of the year 1931.

The net worth of the common stock, consisting of 1,464,371 shares of no par value, was $23,216,778 or $15.85 a share.

Plantations

The operations of the plantations have been affected by the decline in the market price of crude rubber, which reached a new low level of 4¼ cents during 1931 and was at approximately 5 cents at the close of the year. Expenses have been greatly reduced and the rate for amortization has been adjusted to a basis which is more accurate in view of experience than the rate of accelerated amortization heretofore used. There was a loss of $239,618 before depreciation and amortization of $1,116,503 which resulted in a charge of $1,356,121 to surplus for the year.

Production for the year amounted to 41,811,000 pounds, compared with 36,620 000 pounds in 1930. 99 500 acres are planted and 72,000 acres are in bearing, with an average yield per acre of 581 pounds.

F. B. Davis, Jr.
Chairman

1790 Broadway,
New York, N. Y.
March 5, 1932.

New Incorporations

Brunswick Rubber Products Co., Feb. 16 (N. J.) T. M. Clark, N. Brunswick Township, R. Clark, Comstock St., and W. J. Harding, 147 Albany St., both of Brunswick, all in N. J. Principal office, Patrick's Corner, N. Brunswick Township, N. J. Manufacture various kinds of rubber goods.

Caldwell & Atwood Rubber Products Co., of Whitman, Feb. 9 (Mass.), $50,000, 500 shares at $100, and 100 common shares, no par value. J. R. Caldwell, president, G. E. Atwood, treasurer, and R. B. Ross. Molded and plastic rubber products for use in household and office.

The C. L. Cohen Mfg. Co., of Boston, Feb. 15 (Mass.), $10,000, 100 shares of stock, par value $100. President and treasurer, C. L. Cohen, 24 Mt. Bowdoin St., Dorchester, Mass., J. Cohen, and J. T. Sullivan. Manufacture raincoats and other wearing apparel.

Dyon Corp. of Rhode Island, Feb. 29 (R. I.), 100 shares common stock, no par value. A. L. James, 8 Eudora St., A. Hilditch, and J. F. Powers, all of Providence, R. I. Manufacture rubber goods.

The Elastic Braid Co. of Providence, Mar. 1 (R. I.), $125,000, 1,250 shares preferred, par value $100, and 26 shares common stock, no par value. W. R. Fowler, M. A. Wood, and M. L. Wilkinson, all of Westerly, R. I.

General Tire Co., of Providence, Feb. 19 (R. I.), 500 shares common stock, no par value. L. I. Hogan and A. G. Murphy.

H. S. Metal & Rubber Corp., Feb. 16 (N. Y.), $20,000. H. and S. Singer, both of 905 Schenectady Ave., and W. Singer, 1492 Pitkin Ave., all of Brooklyn, N. Y.

Olympic Rubber Products Co., Feb. 26 (N. J.) 2,500 shares, no par value. F. O. Price, F. S. Frankel, and M. E. Kempler, all of 1180 Raymond Blvd., Newark, N. J. To manufacture various kinds of rubber products.

Rubber Mills Outlet Corp., of Boston, Feb. 9 (Mass.), 250 common shares, no par value. H. Salzman, president, E. Weiss, treasurer, both of 208 Essex St., Boston. Another stockholder is B. Bernard.

St. Clair Rubber Products Co., Inc., Jan. 8 (N. Y.), $10,000. J. Frank, 2088 E. 22nd St., J. Lapon, 984 Coney Island Ave., both of Brooklyn, and E. Miller, 250 W. 103rd St., New York, all in N. Y. Rubber products.

Victor Rubber Corp., Dec. 11 (Del.), 500 shares preferred, par value $100, and 60,000 shares common stock, no par value. C. B. Peabbles, L. E. Gray, and L. H. Herman, all of Wilmington, Del. Manufacture, buy, and sell rubber goods and products.

Rubber Trade Inquiries

The inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

No.	Inquiry
1463	Manufacturer of machines for spraying hard rubber goods in molds.
1464	Manufacturer of molds in which to pour tin.
1465	Manufacturer of rubber door wedges.
1466	Manufacturer of rubber socket plug known as the "Good Lite."
1467	Supplier of wood flour.
1468	Information on a practical method of rubber boot and shoe ventilation.
1469	Manufacturer of a heavy paper or cardboard known as Micarta.
1470	Manufacturer of a human head of rubber.
1471	Source of supply of chlorinated rubber.
1472	Manufacturer of the Lewis mat making machine.

Foreign Trade Circulars

Special circulars containing foreign rubber trade information are now being published by the Rubber Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Number	Special Circulars
3189	Canadian exports of footwear, calendar year 1931.
3190	Canadian exports of belting and hose, calendar year 1931.
3192	United States exports trade in scrap and old rubber.
3194	United States imports of boots, shoes, and other footwear uppers of wool, etc., by months, calendar year 1931.
3195	United States imports of automobile casings, calendar year 1931.
3196	United States imports of toys, including toy balloons, calendar year 1931.
3197	United States imports of druggists' sundries, calendar year 1931.
3199	British exports of automobile casings, December and calendar year 1931.
3200	British exports of footwear, December and calendar year 1931.
3201	French tire exports, December and calendar year 1931.
3202	French footwear exports, December and calendar year 1931.
3203	Comparative tire exports from the United States, Canada, United Kingdom, and France, calendar year 1931.
3204	Comparative statement showing number of automobile casings shipped from the United States to foreign countries during 1929, 1930, and 1931.
3205	The British rubber trade 1930.
3206	Comparative exports of boots and shoes from United States, Canada, and United Kingdom, calendar year 1931.
3208	Italian tire exports, first 9 months of 1931.
3209	Crude rubber reexports from the United States, January, 1932.
3211	Belgian tire exports, October and November, 1931.
3212	German tire exports, November, 1931.
3213	German tire exports, December and calendar year 1931.
3216	Belgian tire exports, December and calendar year 1931.
3217	Japanese tire exports, first 11 months, 1931.
3218	Canadian tire exports, January, 1932.
3219	French tire exports, January, 1932.
3220	French footwear exports, January, 1932.
3221	Comparative statement showing number of pairs of boots shipped from the United States to foreign countries during 1929, 1930, and 1931.
3222	Comparative statement showing number of pairs of shoes shipped from the United States to foreign countries during 1929, 1930, and 1931.
3223	Comparative statement showing number of pairs of canvas rubber-soled footwear shipped from the United States to foreign countries during 1929, 1930, and 1931.
3224	Comparative statement showing number of pounds of belting shipped from the United States to foreign countries during 1929, 1930, and 1931.
3225	Comparative statement showing number of pounds of hose shipped from the United States to foreign countries during 1929, 1930, and 1931.
3226	Comparative statement showing number of pounds of packing shipped from the United States to foreign countries during 1929, 1930, and 1931.

What is considered an excellent showing as compared with many other American products is the value of rubber compounding agents, accelerators, retarders, etc., marketed abroad in 1931—the first year they were so classified—$1,157,000.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Aetna Rubber Co	Pfd.	$1.75 q.	Apr. 1	Mar. 15
American Hard Rubber Co	8% Pfd.	$2.00 q.	Apr. 1	Mar. 16
Dominion Rubber Co., Ltd	Pfd.	$1.75 q.	Mar. 31	Mar. 23
Firestone Tire & Rubber Co	Com.	$0.25 q.	Apr. 20	Apr. 5
Garlock Packing Co	Com.	$0.15 q.	Apr. 1	Mar. 22
General Tire & Rubber Co	Pfd.	$1.50 q.	Mar. 31	Mar. 21
Goodyear Tire & Rubber Co., Ltd	Pfd.	1¾% q.	Apr. 1	Mar. 31
Goodyear Tire & Rubber Co. of Calif	Pfd.	$1.75 q.	Apr. 1	Mar. 21
Goodyear Tire & Rubber Co. of Can	Com.	$1.25 q.	Apr. 1	Mar. 13
Goodyear Tire & Rubber Co. of Can	Pfd.	$1.75 q.	Apr. 1	Mar. 15
Norwalk Tire & Rubber Co	Pfd.	$0.87½ in., q.	Apr. 1	Mar. 22
Worthington Ball Co	Class A	$0.50 q.	Apr. 15	Mar. 31

Rubber Industry in Europe

GREAT BRITAIN

British Industries Fair

The British Industries Fair opened on February 22, 1932, at Olympia and the White City, London, and in Birmingham. A number of rubber firms was represented, and a wide variety of goods of all kinds besides machinery was on view.

There was exhibited a new plastic material benzyl cellulose, which is prepared by the action of caustic soda and benzyl chloride on cellulose, and can be put to an unlimited number of uses.

An inflatable rubber boat, that can be used also as bath or bed by campers, attracted much attention. These boats come in blue rubber with white piping in 3 sizes, the largest of which holds 3 adults, while the smallest is intended for children. The whole outfit, including paddles and pump, when not in use, can be made to fit in a small kit bag. The smallest outfit weighs about 12 pounds and the largest 32 pounds.

The Rubber Growers' Association displayed the more inexpensive types of rubber flooring in which, thanks to the Association's propaganda, 6 manufacturers are now interested. Particular attention was directed to the rubber carpets obtainable in squares at prices corresponding to those of ordinary rugs. These rubber carpets do not require attaching to the subfloor or any particular knowledge of laying and can be had in a variety of patterns and colors. Several effective designs were also shown of a new rubber floor covering having a high percentage of raw rubber which imparts a soft feel somewhat similar to that obtained with sponge rubber. Although its weight is only about half that of standard quality flooring, it remains perfectly flat without attachment to the subfloor.

A liquid soap containing Sextol, is intended for cleaning proofed garments. Sextol, together with paraffin wax, is also used for rainproofing materials.

Footwear Conference

The Research Association of British Rubber Manufacturers has formed a special section to study the problems connected with the use of rubber in footwear and has arranged for sectional meetings that will contact with the rubber industry. The second of these conferences was held February 2 at the conclusion of the luncheon which followed the annual meeting of the association. G. Phillips, of Phillips Patents, Ltd., presided and was supported by A. E. Tebbut and C. W. Phipps, vice presidents of the Boot Trade Research Association.

A feature of the occasion was the address by H. Bradley, Director of Research of the Boot Trade Research Association, who stressed the importance of cooperation between the rubber and the footwear industries. Each of these industries has much to learn from the other. He pointed out that cooperation between his Association and the Rubber Research Association in their proposed studies of important properties of solings would prevent over lapping and would be of common benefit. Research for establishing quality standards for rubber solings was essential, he asserted, then went on to discuss a variety of possible uses for rubber in other branches of footwear manufacture, where rubber could possibly be used as a binding medium as in bottom fillings, synthetic insoles, counter stiffeners, and boxtoes. He spoke of the greatly increased use of latex and rubber solution adhesives in folding uppers, in attaching soles, and in making canvas shoes, and mentioned the trouble due to staining delicate materials as satin, crepe de chine, and light leathers, caused apparently by the high percentage of resins in the adhesives. He suggested that this deficiency offered a field for cooperation in evolving satisfactory adhesives specifications.

H. A. Daynes speaking on permeability and foot comfort, raised the fundamental question as to the suitability of design of the whole shoe: "Is it fair to take a design which has evolved after years of experience of leather soles, radically alter the soling material, and expect the shoe still to function satisfactorily? Should not the design be reconsidered to utilize what is best in the new material and counteract any disadvantages which it may have?"

Technical Research

The Technical Research and Development of New Uses Committee of the Rubber Growers' Association has selected investigations considered of primary importance to be carried out under the supervision or joint supervision of the following well-known technologists: H. P. Stevens, consulting chemist, R. G. A.; B. D. Porritt, Director of the Research Association of British Rubber Manufacturers; E. J. Parry; and Noel Heaton. In 2 instances the R. G. A. will collaborate respectively with a large textile undertaking and a well-known linoleum manufacturer.

At present there are investigations under way on (1) the use of latex or rubber dispersions as a constituent of the sizes used for calico printing, dyeing, and stiffening, particularly as regards retention of stiffening ingredients and fillers; (2) incorporation of rubber in oil paints and corresponding investigation with rubber latex and water paints, distempers, etc.; this work will be linked up with fundamental research into latex, and the cooperation of the Rubber Research Institute of Malaya has been invited; (3) deodorization of vulcanized rubber; (4) rubber as jointing material for water and gas mains; (5) oil and petrol resistant rubber; (6) rubber in linoleum.

Preliminary inquiries are also being made regarding the production of a rubber compound made with latex that dehydrates, and certain physical constants to meet engineering requirements.

Census of Production, 1930

The census of production has made available particulars regarding the output of rubber goods in Great Britain in 1930. The data for that year cover 163 establishments employing more than an average of 10 persons; details were lacking in 1930 from concerns that in 1924 employed about 800 persons. A summary of the data given shows that the value of goods made and work done in 1930 (gross output) was £28,119,000 against £23,834,000 in 1924; the cost of materials used came to £13,963,000 against £12,142,000. The net output was valued at £14,143,000 against £11,692,000. There were 50,374 persons employed on the average during 1930 as compared with 47,496 in 1924; while the net output per employe was £281 instead of £246. The concerns covered by the census in 1930 had available prime movers with a total capacity of 46,080 h.p., of which 14,540 h.p. in reserve or idle, against 51,211 h.p., of which 8,234 h.p. in reserve or idle, and electric motors driven by purchased electricity with capacity of 123,641 h.p., 8,316 h.p. in reserve or idle, against 58,924 h.p. in 1924, 3,851 h.p. in reserve or idle.

Company Notes

According to reports a receiver has been appointed on behalf of the first debenture holders of the Sorbo Rubber-Sponge Products, Ltd., Woking, Surrey.

The B. G. R. Holding, Ltd., has been registered with a nominal capital of £50,000 and will, among other things, manufacture and deal in commodities as rubber, gutta percha, etc., also tires, wheels, motor and other vehicles, besides carrying on business of an investment and trust company, and that of chemists, research workers, etc. The first directors, (all members of the board of the British Goodrich Rubber Co., Ltd.,) include Sir Walrond Sinclair, Sir John P. Hewett, and the Hon. S. Pleydell-Bouverie.

If in making vulcanite dentures the model and plaster counterpart are painted with one or 2 coats of a cellulose acetate solu-

tion before the unvulcanized rubber is packed into the plaster mold, the denture can easily be separated from the plaster after vulcanization. The cellulose acetate solution, on drying, leaves a reasonably tough film that is not destroyed during vulcanization, and the resulting denture is clean, while the surface has some degree of polish besides being denser and less porous. A suitable preparation for this purpose has been worked out in the Chemical Department, Guy's Hospital Medical School, London.

After a preliminary trial from Derby to London with a 24-seater Micheline, the London Midland and Scottish Railway has continued to test the new Michelines on runs from Bletchley to Oxford. The success of these tests suggests that Michelines may possibly be adopted on some of the unremunerative branch lines.

A draft Order in Council has been laid before Parliament relating to the marking of imported rubber footwear. This order requires all boots, shoes, slippers of rubber or having rubber soles, as also overshoes and footholds, to bear an indication of origin at the time of importation and of sale or when exposed for sale in the United Kingdom.

Institution of the Rubber Industry

At the tenth annual general meeting of the Institution of the Rubber Industry in London on February 2, Eric MacFadyen was reelected president, and the following were elected Members of Council: Sir Herbert Blain, J. H. Blake, S. A. Brazier, L. Brown, H. H. Burton, A. E. Byrne, L. Caswell, G. N. Cook, C. B. Copeman, N. Cow, N. E. Duck, A. O. Ferguson, G. A. Findlay, H. Fould, J. Hall, A. Healey, A. E. Hemsworth, F. W. Hinde, W. F. Lloyd, R. W. Lunn, C. Macbeth, J. H. Mandleberg, A. M. Melville, A. G. Partridge, B. D. Porritt, J. A. Redfern, W. R. Row, J. Traxler, Dr. Twiss, and W. A. Williams.

The following were elected vice presidents: F. D. Ascoli, Sir George Beharrell, George Beldam, Sir Stanley Bois, Col. J. Sealy Clarke, (chairman, Research Association of British Rubber Manufacturers), Hugh C. Coles, Lord Colwyn, Sir Eric Geddes, Alexander Johnston, L. V. Kenward, (chairman, India Rubber Manufacturers' Association), H. G. Montgomery, G. H. Nisbett, (chairman, Cable Makers' Association), Charles Paine, Herbert Rogers, H. C. Street, (chairman, Rubber Trade Association), Sir F. Swettenham, J. G. Hay, D. F. L. Zorn, (chairman, Rubber Shareholders Section).

French Tariff on Rubber Goods

Chamber of Deputies, Paris, France, on March 10 voted an 80% increase on imports of American and Canadian rubber manufactures, principally affecting rubber boots, shoes, and a number of sporting goods. The total value of goods from the United States to be kept out by this new duty will approximate $15,000,000 a year.

GERMANY

Foreign Trade Decline

Incomplete statistics had already indicated that Germany's foreign trade in rubber during 1931 would show a decline, and final figures for the year still further stress this trend. Imports of raw materials, including, besides raw rubber, gutta percha, balata, waste and rubber substitutes, during 1931 were the lowest in 5 years. The total was 480,104 quintals, value 34,384,000 marks, against 557,017 quintals, value 73,978,000 marks in 1930; 591,239 quintals, value 106,391,000 marks in 1929; 512,771 quintals, value 112,920,000 marks in 1928; and 515,043 quintals, value 172,841,000 marks, in 1927. Crude rubber imports totaled 450,558 quintals against 514,220 in 1930. Imports of manufactured goods too are the lowest in the last 5 years. While 1930 totals were 70,341 quintals, value 35,583,000 marks, and even 1927 figures were 62,681 quintals, value 38,330,000 marks, the 1931 totals were only 46,434 quintals, value 22,168,000 marks.

The exports make a better showing, for although also under those for 1927 in value, they were only 5% less than the 1930 exports and 10% below the peak of 1929 as to quantity, for the 1931 figures were 206,811 quintals, value 93,076,000 marks, as compared with 218,687 quintals, value 114,317,000 marks in 1930; 227,990 quintals, value 131,679,000 marks in 1929, and 168,037 quintals, value 102,917,000 marks in 1927.

Every item among the imports of rubber manufactures, except footwear and rubber thread not combined with fabric, declined considerably. Thus automobile tire covers were only 165,712 instead of 299,727, a decrease of about 45%. Imports from the United States suffered most; for whereas it headed the list in 1930 with 102,113 tires, the 1931 quantity of 44,517 places it below Belgium although that country also experienced a reduction in shipments from 76,899 to 50,828. The drop in bicycle tire imports is even more striking, the total for 1931 of 112,573 being but little more than a third of the 1930 shipments of 315,585. The changes in the source of these goods are noteworthy. While in 1930 Belgium led the imports with 150,988, she is now third with only 16,976; France is first, but with only 46,115 instead of 116,575 as in the preceding year; while Italy, which had been a much less important source in 1930 with 33,577 bicycle tires, now with 37,423 ranks second and actually shows a gain.

Shipments of tubes were half what they had been the year before. Those for automobile tires declined from 181,968 to 94,031. Most of these tubes came from Belgium, which, however, sent 37,382 instead of 47,300; America was second, with 18,649 instead of 41,903. Tubes for bicycle tires fell from 172,550 to 83,216. Belgium and France supplied the bulk of these goods as in the preceding year.

Imports of hose were 360 instead of 460 quintals. Whereas America had sent most of these goods in 1930 (206 quintals), it ranked third in 1931 with 76 quintals; Great Britain was first with 119 quintals, and France next with 82 quintals. Driving belts came to 762 instead of 974 quintals, and America again lost to Great Britain, the shipments of the two countries having been 272 against 416 quintals, and 316 against 304 quintals, respectively. In imports of packing, which were 222 instead of 588 quintals, the loss appears to have been mainly borne by the United States, which sent only 105 as against 473 quintals.

The only imports showing increases were thread and footwear. The imports of the former totaled 3,492 quintals instead of 3,237. The chief source was England. Footwear imports have been rising steadily for several years. In 1928 the foreign shipments to Germany came to 752 quintals, rose to 2,704 quintals in 1929, to 4,701 quintals in 1930, and in spite of the depression rose again to 5,011 quintals in 1931. Soviet Russia seems to be chiefly responsible for this increase. Calculating the amounts in pairs, the totals for 1931 were 779,027 and for 1930, 718,982 pairs, of which Soviet Russia shipped no fewer than 244,056 pairs, almost doubling its 1930 shipment of 131,554 pairs. Sweden sent 163,682 pairs instead of 142,690 pairs; Latvia, 85,558 instead of 78,723 pairs; and Czechoslovakia, 53,076 instead of 44,620 pairs. But the United States, which had headed the list in 1930 with 157,558 pairs, fell to third place in 1931 with 121,232 pairs. On going over these import figures, one cannot help noting that the import business from the United States to Germany is apparently falling off more than that of any of the other countries with which Germany carries on extensive business.

The exports, as stated above, have not decreased to the same extent as the imports. Nevertheless exports of tubes for automobiles were almost cut in half, 141,736 instead of 244,694. Germany's best customer for these goods, Argentina, took only 3,496 instead of 42,560 the year before; while Czechoslovakia and British India also showed considerable decreases. Automobile tire covers declined from 302,122 to 190,871, Germany's chief customer in 1930, British India, took only 15,963 instead of 40,613; while Argentina imported 6,477 instead of 29,399. On the other hand shipments to the Netherlands rose from 19,891 to 25,303.

Tubes and tires for bicycles both increased, the former from 2,334,874 to 2,887,834 and the latter from 893,765 to 1,005,800. An unusual rise in the shipments to England is noted, from 572,519 to 1,429,977. Bicycle tire shipments to Denmark, British India, and Netherlands India showed substantial increases.

Footwear exports rose from 1,716,832 to 1,927,583 pairs. Great Britain was by far the best customer. Hose, belting, and packing exports fell; hose from 20,432 to 13,297 quintals; belting from 5,579 to 3,049 quintals; packing from 3,194 to 2,051 quintals. Elastic goods declined slightly from 19,532 to 18,114 quintals.

Exports of hard rubber in sheet and rods increased from 1,622 to 2,630 quintals. The rise was chiefly due to larger shipments to the United States, 2,002 instead of 540 quintals. Manufactures of hard rubber were 8,894 instead of 9,555 quintals.

Rubber Industry in Far East

NETHERLANDS EAST INDIES

Occidental and Oriental Rubber Producers

At a conference of Netherlands East Indies technologists on leave in Holland, W. H. de Jong discussed the relation between the Occidental and Oriental rubber industry. The speaker considered the pros and cons searchingly but impartially, with one end in view: to get a true perception of the situation.

It is practically an axiom in the theory of agricultural economics that where large and small scale agriculture exist side by side and competition is free, the big operator can never crush the small man; whereas in manufacturing the big concern with its up-to-date machinery capable of being constantly perfected can oust the small enterprise. This condition is impossible in purely agricultural undertakings because in the case of manufacturing we have to deal with the combination machine-man, whereas in agriculture we have to consider nature-man, and nature can never be completely dominated by man as the machine is.

Where agriculture is mechanized to a great extent as in wheat-growing in America, the situation is somewhat different, but even here it is not conceded that the intensive West-European industry could be beaten by American methods. If ever large-scale agriculture should succeed in crushing the small man, this defeat would be due not to the strength of the former but rather to the weakness of the latter, for instance if the peasant adopted a higher standard of living and so dropped one of his mightiest weapons, frugality.

Rubber is a good example of a crop requiring intensive labor, for unlike wheat, for instance, it does not lend itself to mechanization; trees cannot be tapped by machinery as grain is cut and bound in sheaves. In the case of a crop like rubber, therefore, the tendency is for the small grower to overwhelm the larger. The Occidental rubber producer, however, has this advantage over his small Oriental rival, that owing to special circumstances in the tropics the usual condition—that the output and the quality of the small operator's product usually are superior to those from the larger is reversed. The Oriental in the tropics laboring under western supervision works better than his colleague in the native gardens. But this circumstance, while beneficial to the big estate, says Mr. de Jong, offers him only a weapon of defense and not of attack against the native producer, for the latter has the far greater advantage of a low standard of living enabling him to adapt himself readily to circumstances and to resist the crisis more effectively than the Occidental.

If the large estate is to oust the native holding, it must make the most of the knowledge and the capital at its disposal as well as of the possibility of combining industry with the planting end of the business, for instance by making special products. The wish being father to the thought, Occidental planters hold that the native competitor would have to stop planting when the price of rubber fell below a certain minimum. Many calculations have been made, but all proved wrong. This, says the speaker, is quite in line with historical facts, and he never expected anything else. The Occidental must stop hoping that native rubber will be attacked by a catastrophe that will affect it alone and annihilate it. Low prices favor the large estate in that they keep native extensions of rubber within bounds, and possibly modern methods on the big estate may lead to a stabilization of native rubber at a certain level, just as the Brazilian wild rubber was stabilized by the development of plantation rubber; but as far as concerns the effect of the crisis on the rubber industry, Mr. de Jong foresees that both Occidental and Oriental will suffer, but the loss to the latter will be less heavy than to the former. History repeats itself, and much the same thing happened in Europe in the great agricultural crisis at the end of the preceding century.

Malayan Notes

The Bandar Rubber Mij. reports a profit of 16,402 guilders for 1931 as compared with 210,351 guilders the year before. The rubber harvested during the year totaled 658,504 kilos and was sold at an average price of 28.85 guilder cents per half kilo as against 63.77 the preceding year. The average yield per hectare increased from 526 to 537 kilos; while costs were reduced from 28.73 cents per half kilo to 17.97 cents. During the year the planted area was extended by 176 hectares, but no further extensions are planned for 1932.

The crop for 1932 is estimated at 830,000 kilos and that for 1933 at 1,080,000 kilos. Forward contracts have been made, for the sale at fixed price, for 577,000 kilos out of crop 1932 at a price of 26.31 guilder cents per half kilo, and 203,000 kilos out of crop 1933 at 38.95 cents per half kilo. In addition 71,120 kilos have been sold forward out of crop 1932 at prevailing London prices with a minimum of 10d., and a maximum of 15d. per pound if the price of rubber should be more than 17d. per pound, and 101,600 kilos out of crop 1933 on the same terms.

It is expected that the cost price for 1932 will again show a reduction though not in the same proportion as the year before. According to latest data available the crop estimates for 1934 are 1,380,000 kilos; for 1935, 1,760,000 kilos; 1936, 2,160,000 kilos; and 1937, 2,480,000 kilos.

At the meeting an interesting discussion took place concerning restriction. One of the shareholders suggested that it was the duty of the government to enforce restriction if only to prevent further unemployment. The chairman replied that Mr. Luytjes, an official from the Dutch East Indies was at present in Holland to discuss restriction, but what this might lead to was not known. Personally the chairman believed that one or 1½ years ago restriction might have brought about improvement but that it could not do much at present. Another well-known Dutch rubber man, Mr. van Leewen Boomkamp, said that the unemployment mentioned by the first speaker would surely increase in the event 50% restriction were enforced, and then there was the question whether it was not more economical if each planter restricted as was thought best.

Netherlands Rubber Union, large rubber-remilling enterprise in the Dutch East Indies, again reports a loss on operations during 1931. The total loss, which at the end of 1930 amounted to 1,355,244 guilders, has been increased to 1,449,679 guilders.

The amount of rubber sold approximated 5,000 tons, including 300 tons shipped from Pontianak. The remilling factory established there had to be shut down in May, 1931, and at present only the factories in Djambi and Palembang are working. However much difficulty is experienced in obtaining sufficient rubber to keep these factories going. During the latter half of 1931 especially, crude had to be bought from the natives at prices that gave a loss. This circumstance resulted in the adverse balance for the year. The company, with its insufficient funds, would have had to propose liquidation of the concern, had not a reorganization proposition been received. Incidentally it was pointed out that in case of liquidation there might not be funds for preferred or common shares.

Rubber Exports

The Bureau of Statistics issues the following preliminary figures regarding exports of rubber from Netherlands East Indies: Java and Madura, 6,037,000 kilos; Outer Provinces, 17,903,000 kilos; total 23,940,000 kilos for December, 1931, as compared with 6,354,000 kilos and 22,208,-000 kilos in December, 1930.

Exports from Java during 1931 came to 77,144 tons and for the Outer Provinces to 207,921 tons, total 285,065 tons; whereas in 1930 the figures had been 70,871 and 200,449 tons respectively.

MALAYA

Rubber Road Surface

Another new process for surfacing roadways with rubber has been invented in Malaya, this time by a Chinese, Wee Theang Siew, of Penang. This recently patented process is claimed to give perfect road surface, hard wearing on top and resilient underneath, and has aroused the interest of Governor Sir Cecil Clementi, who suggested laying an experimental stretch 100 yards long on a busy Penang road.

The new invention seeks to avoid the defects of present forms of rubber blocks, which Wee Theang Siew told a representative of the *Malayan Tin and Rubber Journal* are due to the fact that crevices form where the blocks are joined and in Winter the cold causes these cracks to widen and admit water which freezes and makes the blocks bulge in the center of the roadway with the result that repairs are necessary every year. In his method cushion gum is first spread over the concrete on which the tough rubber compound sheeting is then laid. The cushion gum, a soft sticky white composition consisting of soft rubber and chemicals, serves as a bond between the concrete and road surface and also absorbs traffic shocks and vibrations. Vulcanization is effected by a portable vulcanizing apparatus which consists of a series of interlocking metal plates that form a flat surface to cover the needed area; and a steam chest having a flat base and connected to a portable boiler which supplies the heat. When the plates have been locked on top of the rubber sheeting, the steam chest is placed on the plates for a sufficient time to vulcanize the rubber to the concrete underneath. The time of cure is 6 minutes, and perfect adhesion is obtained, it is claimed.

Wee Theang Siew proposes to use a total rubber surface of ¾-inch thick, which should suffice except for very heavy traffic. The soft cushion gum layer would be ⅛- to ¼-inch thick, and the tough rubber, which could have an antiskid design, ⅝-inch thick. The cost of the road surface is estimated at 50s. to 60s. per square yard with rubber at 9d. per pound, which is considerably more expensive than even granite sets; but the rubber road is expected to last from 20 to 30 years and to require very little expenditure for upkeep. It is figured that on a 40-foot roadway 85 tons of rubber per mile would be required.

Why Outputs Are High

Many of those opposed to restriction originally were influenced by the consideration that when rubber fell to a certain level, the weaker estates would drop out and leave the field to the strongest. But the level has had to be progressively lowered and though rubber prices are now about as low as anyone could dare to figure on, comparatively few estates are closing down, and outputs on the whole show no signs of decreasing to any appreciable extent, thus giving prices a chance to go up. Outsiders ask why? Two small quotations from recent issues of the *Straits Budget* ought to help answer the question satisfactorily. The first, from the annual report of the Kundong Rubber Estates, Ltd., reads:

"In the earlier part of the year the tapping system was modified to some extent by application of selective tapping principles, but with the fall in labor rates generally it has been found more advantageous again to introduce full tapping and this is now in operation."

The second is an advertisement reproduced by the above periodical from a Kuala Lumpur paper, as follows: "European planter-accountant undertakes to supervise 100/1000 acre estates in Negri Sembilan, using Chinese contract labor, tapping, curing, transport, bare upkeep, and supervision for 6 cents (Straits currency) per pound."

That is to say, it is sought to beat depressed prices by taking advantage of the unemployment conditions to produce more rubber, which only results in still further depressing the rubber market. Of course the periodical quoted sees the matter in a different light and reprints the advertisement as an example of what the rubber planter can do in the matter of economy when he really tries, and adds the following quotation from a recent address by the Director of the Rubber Research Institute of Malaya:

"I think most of us are aware of the remarkable reduction in costs of production which has been effected without any material deterioration of estates during the last 2 years. I am certain that many members of the industry . . . would have said about 2 years ago that it was impossible to produce raw rubber at 7 to 8 cents a pound. I am perfectly aware that all estates are unable to do this and possibly never will be able to do it, but, however much we may be in favor of some method of control or restriction of output, I think we shall agree that it would not be for the good of this industry, or of any industry, to bolster up the price of a product to an extent which would enable inefficient estates or bad areas to carry on."

But we see, inefficient estates have only to hire a European planter-accountant as above to cut their costs to 6 cents per pound.

Superficially viewed there seems to be no sanity in a situation where lowered costs leading to higher outputs and consequent further falling of the rubber market, are encouraged. But let us consider the facts. There is first the remarkable phenomenon of a practically complete cessation of restriction talk in Malaya in spite of the fact that prices are lower than ever. The planter here has evidently stopped seeking his salvation in restriction and has adapted himself to present conditions. He comforts himself with the thought that his circumstances are slightly less unhappy than those of the Dutch; he has some real advantages over the Dutch planter in Sumatra for he can, as shown above, profit by the present economic conditions to get his estate worked at very low costs, which the planter in Sumatra with his indentured Javanese coolies is unable to do to the same extent; then the depreciated pound also works in his favor, and so while the Dutch call meetings without end to discuss restriction, he simply goes on producing all the rubber he can at the lowest possible price. Has he at last taken on the much-mooted fight to a finish with the Dutch?

Tapping Systems

The *Malayan Agricultural Journal* publishes interesting data concerning tapping methods on estates as obtained from returns prepared by rubber estates of over 100 acres in the Federated Malay States and Straits Settlements, concerning production, acreage tapped and rested, and method of tapping during July, 1931.

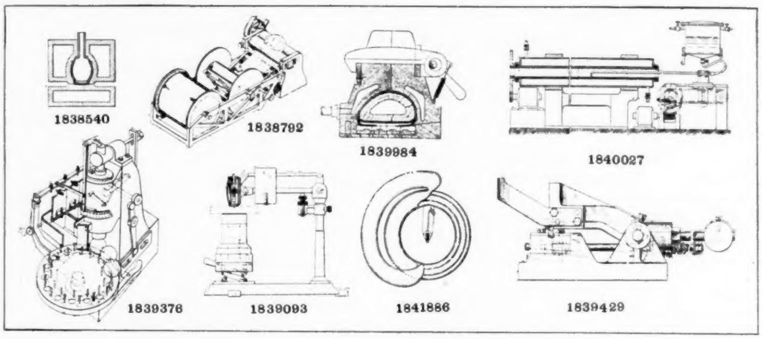
Excluding 108 estates, representing 55,975 acres, which had entirely ceased tapping and a further total area of 132,785 acres out of tapping on estates that had partly closed down, there remains a total of 767,788 acres of tappable rubber on areas of 100 acres and over in the Federated Malay States and Straits Settlements. However of this, incomplete information was obtained from 3% so that the information relates to 744,760 acres, or 97% of the balance.

During recent years the system of tapping on Malayan estates has for the most part changed from daily tapping to alternate daily tapping, while there is a marked tendency for estates to adopt still more conservative methods of rotational or periodic tapping. The adoption of the newer methods was, of course, stimulated by the conditions brought about by the Stevenson Scheme. However it was soon discovered that although yields decline upon introduction of such methods, the trees quickly regain their yield. At the present time the average yield of rubber per acre on large estates is higher than formerly and tends still further to improve.

The figures show that at present 526,831 acres or 72.1% of the tappable rubber is tapped alternate daily, 153,150 acres or 20.6% on rotational systems, and only 7.3% daily. The daily tapping system is commoner in the Straits Settlements than in the Federated Malay States owing to the fact that in the former there is a larger proportion of estates owned by Chinese and other Asiatics than in the Federated Malay States.

The article concludes with the remark that there is little doubt that rubber trees on estates now have big reserves of bark, and that the health and yielding capacity are still further conserved by present tapping methods. Therefore if prices should justify the course, it is expected that estates by adopting more drastic methods could for a limited time immediately increase yields.

Patents, Trade Marks, Designs



Machinery

United States

1,838,540.* **Molded Shoe.** This 3-piece mold for forming rubber footwear before complete vulcanization receives a last upon which a lining and several rubber parts have been assembled. After utilizing the molds for curing the article sufficiently to permit its retaining shape about the last, the mold is opened and the shoe is completely vulcanized in any desired manner, thus reducing the molding equipment required owing to shortened molding time. H. C. L. Dunker, Helsingborg, Sweden.

1,838,792.* **Stock Storage Device.** This apparatus and method for handling calendered stocks eliminates manufacturing operations, prevents premature aging, and reduces stock damage particularly on embossed or figured sheets. A special type of wrapper having built-up, flexible edges which act as stock spacers when wound is used in combination with a reeling-up device for loading at the calender take-off. Reels may then be transported for storage or subsequent cutting operations. E. W. Stacey, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.

1,839,093.* **Rubber Hardness Tester.** A feature of this invention is that it does away with the human element which makes for inaccuracy of the results by providing that the plunger is pressed upon the tested material with an exact predetermined force. Thus the accuracy of the test is unaffected by different inspectors making the test. H. D. Geyer and E. J. Dill, assignors to Inland Mfg. Co., all of Dayton, O.

1,839,376.* **Ball Hardness Grader.** A device particularly adapted for testing the compressibility of articles made wholly or partly of rubber such as tennis balls, golf balls, the cores for golf balls or rubber balls generally. The device also comprises means both for directing the objects to or away from the testing devices into receptacles corresponding with the grades defined by the results of the tests. T. Cropper, Erdington, assignor to Dunlop Rubber Co., Ltd., London, both in England.

1,839,429.* **Tread Strip Former.** This device comprises a machine for inserting a length of tread rubber through the slot of its retaining channel so as to leave a portion of the strip extending above to form a tread surface while screws beneath for securing it are positioned. The entire length of the rubber strip, compressed laterally to fit the narrowed channel top opening, is then pushed downwardly by a vertical plunger to a position within the channel where the rubber expands against the inner walls. H. A. Weaver, Indianapolis, Ind., assignor to Manning & Co., Chicago, Ill.

1,839,984.* **Rubber Soled Footwear.** Apparatus used for a molded, rubber soled, leather shoe consists of a hot table upon which is mounted a locked and hingedly connected water cooled mold. The leather shoe with cemented, vulcanizable cover sole is placed into the mold with its tread sole attached and the entire sole portion compacted under heat by an inflatable rubber bag which acts downwardly against a metal sole plate positioned within the shoe structure. H. McGhee, Rushcutters Bay, Australia.

1,840,027.* **Inner Tube Machine.** This apparatus and method is for manufacturing inner tubes from rubber latex. The machine uses the centrifugal principle for forming a rubber tube from a liquid which has been projected against the inner walls of a rotating cylinder from a reciprocating nozzle. The liquid tube formed is held by centrifugal force until vulcanization has been completed either by heat or by the acid method. E. Fetter, Baltimore, Md.

1,841,886.* **Inner Tube.** A unique method makes inner tubes of endless formation from deposited rubber on an angularly butted circular mandrel which utilizes the hole made for its supporting member through the tube as a means of removal. The mandrel is revolved in a rubber solution to required thickness, and the tube is cured before removal through the angular slit by a hole in the tube, which is later used for the valve patch opening. J. R. Gammeter, Akron, O.

1,842,417. **Stuffing Apparatus.** C. B. Matz, Akron, O.

1,842,428. **Tire Band Builder.** F. J. Shook, assignor to National Rubber Machinery Co., both of Akron, O.

1,842,646. **Vulcanizing Apparatus.** V. E. Atkins, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,842,652. **Expansible Core.** N. W. Biggs, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,842,719. **Footwear Cutting Device.** H. C. L. Dunker, Helsingborg, Sweden.

1,842,758. **Pulp Beater.** A. D. Little, Brookline, Mass., assignor, by mesne assignments, to Rubber Surfacers, Inc., Wilmington, Del.

1,842,818. **Tire Balancer.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.

1,843,074. **Compression Flexometer.** F. D. Abbott, assignor to Firestone Tire & Rubber Co., both of Akron, O.

1,843,080. **Cracker Refeeding Device.** R. L. Dauber, assignor to Xylos Rubber Co., both of Akron, O.

1,843,173. **Denture Press and Vulcanizer.** W. M. Post, Hood River, Ore.

1,843,850. **Tire Making Machine.** P. D. Thropp, deceased, by C. M. Thropp, co-executrix, and L. A. Moreland, assignors to de Laski & Thropp Circular Woven Tire Co., all of Trenton, N. J.

1,844,312. **Elastic Strand Winder.** T. Cropper, Erdington, assignor to Dunlop Rubber Co., Ltd., London, both in England.

1,844,489. **Tire Builder.** N. L. Warner, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,844,505. **Tire Repair Vulcanizer.** J. C. Heintz, Lakewood, O.

1,844,838. **Composite Fabric Apparatus.** M. Buffington, Roselle Park, assignor to Lea Fabrics, Inc., Newark, both in N. J.

1,844,962. **Vulcanizer.** O. J. Kuhlke, assignor, by mesne assignments, to National Rubber Machinery Co., both of Akron, O.

1,846,044. **Tire Builder.** G. F. Wikle, Milwaukee, Wis., assignor to Fisk Rubber Co., Chicopee Falls, Mass.

1,846,048. **Plastic Tester.** C. H. Desautels, Springfield, assignor to Fisk Rubber Co., Chicopee Falls, both in Mass.

1,846,241. **Rubber Tester.** G. J. Albertoni, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,846,253. **Rubber Thread Apparatus.** J. R. Gammeter, Akron, O.

1,846,260. **Chafing Strip Builder.** R. S. Kirk, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,846,342. **Golf Ball Thread Winder.** C. MacBeth, Four Oaks, Birmingham, assignor to Dunlop Rubber Co., Ltd., London, both in England.

1,846,638. **Valve Nut and Inside Assembler.** N. E. Gardiner, Cuyahoga Falls, and G. B. Nichols, assignors to Firestone Tire & Rubber Co., both of Akron, all in O.

*Pictured in group **illustration.**

Dominion of Canada

319,267. **Valve Nut and Inside Assembler.** Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont., assignee of N. E. Gardiner and G. B. Nichols, co-inventors, both of Akron, O., U. S. A.

319,556. **Cutter and Stripper.** W. W. Spadone, New York, and C. C. Spadone, Rockville Centre, co-inventors, both in N. Y., U. S. A.

319,585. **Dipped Goods Apparatus.** J. R. Gammeter, Akron, O., U. S. A.

319,655. **Time Study Device.** Dominion Rubber Co., Ltd., Montreal, assignee of M. F. Anderson, Westmount, and F. H. Horton and J. O. Biron, both of Montreal, co-inventors, all in P. Q.

319,709. **Extruder.** Western Electric Co., Inc., New York, N. Y., assignee of B. M. A. Trebes, Berwyn, Ill., both in the U. S. A.

319,827. **Making Molds.** Goodyear Tire & Rubber Co., assignee of L. B. Sebrell, both of Akron, O., U. S. A.

319,828. **Sheet Material Measurer.** Goodyear Tire & Rubber Co., assignee of R. D. Evans, both of Akron, O., U. S. A.

319,830. **Tire Tread Wear Measurer.** Goodyear Tire & Rubber Co., assignee of G. J. Albertoni, both of Akron, O., U. S. A.

United Kingdom

359,193. **Sole Laying Press.** P. O. Michalk, Dresden, Germany.

359,211. **Physical Quality Tester.** Hungarian Rubber Goods Factory, Ltd., Budapest, Hungary.

359,458. **Molding Chewing Gum by Rolling Machine.** G. B. Mustin, Lansdowne, Pa., U. S. A.

360,017. **Fibrous Sheet Material Device.** Soc. Invenzioni Brevetti Anon.-Torino, Turin, Italy, assignee of A. Mackay, Asbury Park, N. J., U. S. A.

360,122. **Footwear Mold.** H., A., and G. Steppé, all of Brussels, Belgium.

360,372. **Fibrous Sheet Material Device.** Soc. Invenzioni Brevetti Anon.-Torino, Turin, Italy, assignee of A. Mackay, Asbury Park, N. J., U. S. A.

360,586. **Tire Repair Vulcanizer.** Office Général Des Spécialités Automobiles, Seine, France.

360,773. **Tire Tube Deflater.** A. Schrader's Son, Inc., Brooklyn, assignee of J. Wahl, Rosedale, both in N. Y., U. S. A.

360,994. **Feeding Material to Extruder.** Western Electric Co., Ltd., London. (Bell Telephone Laboratories, Inc., New York, N. Y., U. S. A.)

360,995. **Wire Covering Extrusion Machine.** Western Electric Co., Ltd., London. (Bell Telephone Laboratories, Inc., New York, N. Y., U. S. A.)

361,005. **Tire Vulcanizer.** L. Mellersh-Jackson, London. (H. Erikson, Lowell, Mass., U. S. A.)

361,060. **Driving Belt Apparatus.** Dunlop Rubber Co., Ltd., London, and H. Bartle, of Dunlop Rubber Co., Ft. Dunlop, Birmingham.

361,226. **Tire Mold.** Goodyear Tire & Rubber Co., Akron, O., U. S. A.

361,302. **Traversing Cutter.** W. W. and C. C. Spadone, both of New York, N. Y., U. S. A.

361,326 and 361,327. **Wire Covering Extrusion Machine.** Western Electric Co., Ltd., London. (Bell Telephone Laboratories, Inc., New York, N. Y., U. S. A.)

361,921. **Rubber-covered Weftless Fabric Machine.** Dunlop Rubber Co., Ltd., London, and H. Willshaw, of Dunlop Rubber Co., Ft. Dunlop, Birmingham.

362,280. **Mixer.** Farrel-Birmingham Co., Inc., Ansonia, assignee of W. A. Gordon, Shelton, both in Conn., U. S. A.

362,357. **Mixer.** Firestone Tyre & Rubber Co., Ltd., Middlesex, assignee of H. D. Stevens, Akron, O., U. S. A.

Germany

543,517. **Tire Pressure Indicator.** C. W. Godson-Little, Enfield, England. Represented by R. and M. M. Wirth, C. Weihe, and H. Weil, all of Frankfurt a. M., and T. R. Koehnhorn, Berlin.

544,015. **Support for Long Hydraulic Presses.** G. Siempelkamp & Co., Krefeld.

544,016. **Sponge Rubber Machine.** W. Bernet, New York, N. Y., U. S. A. Represented by B. Kugelmann, Berlin.

544,409. **Braided Hose Machine.** Gesellschaft fur Elektrische Isolierungen G. m. b. H., Zehdenick i. d. Mark.

545,079. **Disk for Elastic Couplings.** Flexia-Gesellschaft fur Maschinenelemente m. b. H., Berlin.

Designs

1,202,934. **Heel Mold.** Carl Egert Maschinen-u. Formenfabrik, Wuppertal-Barmen.

1,203,080. **Plastic Mill.** Fried-Krupp Grusonwerk A. G., Magdeburg-Buckau.

1,205,348. **Vulcanizing Tread Mold.** A. Frolich, Hannover.

1,206,649. **Attaching Heels and Soles.** H. Kratzig, Essen a. d. Ruhr.

Process

United States

1,842,456. **Preserving Tennis Ball Resiliency.** D. R. MacKenzie, assignor to American Can Co., both of New York, N. Y.

1,842,586 and 1,842,587. **Channeled Strip Material.** E. E. Davidson, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,842,746. **Carpeting.** P. H. Chance, Montclair, N. J., assignor to Collins & Aikman Corp., Philadelphia, Pa.

1,843,322. **Artificial Skin with Natural Hair Preparation.** D. Haviland, Sawtelle, Calif.

1,843,432. **Masking Device.** H. N. Nickerson, Cleveland, O.

1,844,467. **Constructional Material.** A. C. Fischer, Chicago, Ill., assignor to Philip Carey Mfg. Co., a corp. of O.

1,846,239. **Nonadhesive Liner.** W. D. Wolfe, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

1,846,269. **Tire Making.** A. J. Musselman, Chicago, Ill., assignor to Goodyear Tire & Rubber Co., Akron, O.

1,846,309. **Gas Cell Fabric.** W. C. Calvert, assignor to Goodyear Tire & Rubber Co., both of Akron, O.

United Kingdom

357,341 and 357,342. **Pneumatic Tire.** Goodyear Tire & Rubber Co., Akron, O., U. S. A.

358,373. **Cable.** Deutsche Kabelwerke A. G., Berlin, Germany.

359,110. **Pneumatic Tire.** Dunlop Rubber Co., Ltd., London, and W. H. Paull, of Dunlop Rubber Co., Ft. Dunlop, Birmingham.

360,607. **Coloring Rubber Banknote Paper.** H. Beckmann, Berlin, Germany.

360,912. **Molding Boots.** C. H. R. Collins, Liverpool.

361,300. **Sieve Wire Netting.** Compagnie Générale D'Electricité, Paris, France.

362,095. **Strengthening Furs.** N. Roth, Vienna, Austria.

Chemical

United States

1,842,989. **Age Resister.** W. Kropp, Elberfeld, and L. Rosenthal, Vohwinkel, assignors to I. G. Farbenindustrie A. G., Frankfort a. M., all in Germany.

1,843,216 and 1,843,388. **Reclaiming Rubber.** T. J. Fairley, Sterlington, assignor, by direct and mesne assignments, of ½ to W. J. Hunter and ½ to M. P. Hunter, both of Shreveport, all in La.

1,843,443. **Treatment of Rubber.** S. M. Cadwell, Leonia, N. J., assignor to Naugatuck Chemical Co., Naugatuck, Conn.

1,843,576. **Reenforcing Rubber Pigment.** R. R. McClure, Pittsburgh, and J. W. Church, Carnegie, assignors to Pure Calcium Products Co., Pittsburgh, all in Pa.

1,844,306. **Rubber Compound.** E. V. Williams, Chicago, Ill.

1,844,943. **Treatment of Rubber.** S. M. Cadwell, Leonia, N. J., assignor to Naugatuck Chemical Co., Naugatuck, Conn.

1,845,158. **Coloring Rubber.** R. Krech, Mannheim, assignor to I. G. Farbenindustrie A. G., Frankfort a. M., both in Germany.

1,845,346 and 1,845,347. **Age Resister.** W. Scott, assignor to Rubber Service Laboratories Co., both of Akron, O.

1,846,247. **Rubber Polymers and Oxides.** H. A. Bruson, assignor to Goodyear Tire & Rubber Co. both of Akron, O.

1,846,363. **Waste Rubber Treatment.** A. W. Schisler, Webster Groves, Mo.

1,846,790. **Gas Cell Proofing.** W. C. Calvert, Cuyahoga Falls, assignor to Goodyear Tire & Rubber Co., Akron, both in O.

1,846,810. **Resilient Make-ready Element.** R. R. Lewis, Freeport, and A. J. Weiss, Brooklyn, assignors to Vulcan Proofing Co., New York, all in N. Y.

Dominion of Canada

319,194. **Re-utilizing Vulcanized Waste.** O. C. Hosking, Sydney, N. S. W., Australia.

319,277. **Antioxidant.** Goodyear Tire & Rubber Co., assignee of W. M. Lauter, both of Akron, O., U. S. A.

319,284. **Rubber Cloth Varnish.** Imperial Chemical Industries, Ltd., London, assignee of R. Hill and E. E. Walker, co-inventors, both of Manchester, all in England.

319,656. **Ornamental Luster Finish.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. E. McKay, Providence, R. I., U. S. A.

United Kingdom

358,997. **Rubber Sponge Composition.** G. P. Denton, Rickmansworth, Hertfordshire.

359,007. **Age Resister.** L. Teitge, Berlin, Germany.

359,045. **Age Resister.** A. Carpmael, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

359,286. **Age Resister.** Goodyear Tire & Rubber Co., Akron, O., U. S. A.

359,447. **Non-inflammable Sponge Rubber.** G. P. Denton, Rickmansworth, Hertfordshire.

359,820. **Accelerator.** Imperial Chemical Industries, Ltd., London.

359,944. **Rubber Adhesive.** J. Y. Johnson, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

359,960. **Accelerator.** Imperial Chemical Industries, Ltd., London, H. M. Bunbury, W. J. S. Naunton, and W. A. Sexton, all of Manchester.

360,133. **Accelerator.** I. G. Farbenindustrie, A. G., Frankfort a. M., Germany.

360,490 and 360,491. **Accelerator.** A. Carpmael, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

360,599. **Reenforcing Rubber.** Dunlop Rubber Co., Ltd., London, D. F. Twiss and F. A. Jones, both of Dunlop Rubber Co., Ft. Dunlop, Birmingham.

360,821 and 360,822. **Rubber Composition.** A. Carpmael, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

360,852. **Rubber Product.** A. Davies, London.

360,869. **Fibrous Composition.** Compagnie Générale D'Electricité, Paris, France.

360,934. **Synthetic Rubber.** A. Davies, London.

360,949. **Accelerator.** A. Carpmael, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

361,217. **Paint Stripping Composition.** J. Lewy, Berlin, Germany.

361,280. **Container Lining Composition.** L. G. Lange, Passaic, N. J., U. S. A.

361,917. **Accelerator.** Imperial Chemical Industries, Ltd., London, H. M. Bunbury, J. S. H. Davies, and W. J. S. Naunton, all of Blackley, Manchester.

361,971. **Accelerator.** Firestone Tyre & Rubber Co., Ltd., Brentford, Middlesex, assignee of M. H. Zimmermann, Akron, O., U. S. A.

361,981. **Age Resister.** A. Carpmael, London. (I. G. Farbenindustrie A. G., Frankfort a. M., Germany.)

Germany

544,134. **Preserving Rubber.** B. F. Goodrich Co., New York, N. Y., U. S. A. Represented by G. Benjamin, Berlin-Charlottenburg.

544,327. **Rubber Products.** I. G. Farbenindustrie A. G., Frankfurt a. M.

544,543. **Vulcanizing Rubber.** Roessler & Hasslacher Chemical Co., New York, N. Y., U. S. A. Represented by G. Lotterhos, Frankfurt a. M.

544,733. **Hard Rubber.** I. G. Farbenindustrie A. G., Frankfurt a. M.

544,930. **Colored Hard Rubber.** Allgemeine Elektricitats - Gesellschaft, Berlin.

545,116. **Rubber Coating.** Imperial Chemical Industries, Ltd., London, England. Represented by S. Hamburger, Berlin.

545,375. **Rubberlike Masses from Oils.** D. Gestetner, Ltd., London, England. Represented by H. Heimann, Berlin.

545,635. **Vulcanizing Process.** I. G. Farbenindustrie A. G., Frankfurt a. M.

General

United States

1,842,387. **Sport Shoe.** D. A. Cutler, Wollaston, assignor to Alfred Hale Rubber Co., Atlantic, both in Mass.

1,842,532. **Elastic Wheel.** T. S. Martinez, Sabadell, Barcelona, Spain.

1,842,563. **Condenser Tube Slug.** W. F. Oberhuber, Lansdowne, assignor to Franklin Development Co., Philadelphia, both in Pa.

1,842,582. **Flexible Shaft Coupling.** G. W. Bulley, Akron, O., assignor, by mesne assignments, to Miller Rubber Co., Inc., Wilmington, Del.

1,842,606. **Identification Patch.** M. Hart, Vancouver, Wash.

1,842,607. **Hood Cushion.** F. L. Haushalter, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

1,842,616. **Insulating Tape.** I. W. Levine, Montreal, P. Q., Canada.

1,842,734. **Door Holding Device.** L. Saives, Paris, assignor to L. Renault, Brillancourt, Seine, both in France.

1,842,799. **Tire Filler.** E. E. Redden, Springfield, Mass.

1,842,918. **Tire and Wheel.** C. L. Romero, New York, N. Y.

1,842,923. **Shade Guide.** G. P. Wannemacher, New York, N. Y., assignor to Amalgamated Dental Co., Ltd., London, England.

1,843,349. **Artificial Leather Fabrication.** W. B. Van Arsdel, assignor to Brown Co., both of Berlin, N. H.

1,843,372. **Artificial Leather Fabrication.** G. A. Richter and W. B. Van Arsdel, assignors to Brown Co., all of Berlin, N. H.

1,843,426. **Variable Speed Transmission.** R. Lee, assignor to Lee Engineering Research Corp., Milwaukee, Wis.

1,843,433. **Window Channel.** H. D. Randall, assignor to Randall Co., both of Cincinnati, O.

1,843,511. **Heel.** P. F. Havey, Washington, D. C.

1,843,527. **Swimming Jacket.** A. Tubiolo, Columbus, O.

1,843,812. **Bottle Closure and Dropper.** T. J. Dykema, Pittsburgh, Pa.

1,843,846. **Tire.** M. S. Sutton, Brooklyn, N. Y.

1,843,855. **Shock Absorber.** J. W. Watson, Wayne, Pa.

1,843,893. **Vehicle Seat Cushion.** E. F. Becher, Buffalo, N. Y.

1,844,067. **Replaceable Heel.** J. Lippert, Chicago, Ill.

1,844,200. **Shock Absorber.** B. Bronson, Lakewood, assignor to Ohio Rubber Co., Cleveland, both in O.

1,844,249. **Cloth Press Mat.** H. M. Halls, Los Angeles, Calif.

1,844,434. **Composition Board.** B. D. McIntyre, Monroe, Mich.

1,844,576. **Headrest.** W. J. Heintz, Utica, N. Y.

1,844,641. **Valve Packing.** G. F. De Wein, assignor to Allis-Chalmers Mfg. Co., both of Milwaukee, Wis.

1,844,729. **Pencil Sharpener and Eraser.** W. F. Wells, Cannon Falls, Minn.

1,844,755. **Resilient Mounting Bracket.** H. D. Geyer and L. P. Christman, assignors to Inland Mfg. Co., all of Dayton, O.

1,845,008. **Sole.** N. Wallace, assignor to Kelly-Springfield Tire Co., both of Cumberland, Md.

1,845,196. **Vacuum Article Holder.** A. Schaff, assignor to Scovill Mfg. Co., both of Waterbury, Conn.

1,845,583. **Sectional Tire and Wheel.** J. B. Des Rosiers, Providence, R. I.

1,845,698. **Bottle Stopper.** J. Birrell, La Porte, Tex.

1,845,790. **Harness.** A. W. Godfrey, E. St. Louis, Ill.

1,845,803. **Motor Mounting.** R. K. Lee, assignor to Chrysler Corp., both of Detroit, Mich.

1,845,858. **Friction Member.** J. W. Watson, Wayne, and C. S. Redfield, Chestnut Hill, assignors to John Warren Watson Co., Philadelphia, all in Pa.

1,845,932. **Draft Gear Cushioning Means.** H. D. Page, Depew, N. Y., assignor to Waugh Equipment Co., Chicago, Ill.

1,846,042. **Pneumatic Tire Casing.** W. J. Taylor, Springfield, assignor to Fisk Rubber Co., Chicopee Falls, both in Mass.

1,846,097. **Music Leaf Turner.** E. M. Fritz, Chicago, Ill.

1,846,166. **Electric Lamp Elastic Suspension.** J. Voss, Altona-Osdorf, Germany.

1,846,311. **Valve Cap Air Leak Detector.** A. W. Clare, Seattle, Wash.

1,846,450. **Sole and Heel.** E. T. Packard, assignor to Avon Sole Co., both of Avon, Mass.

1,846,538. **Fish Lure.** J. W. Albers, Antigo, and A. J. Anderson, Waupaca, both in Wis.

1,846,570. **Photographic Apparatus Tank System.** B. B. Rochestie and W. H. Jaeger, both of Trenton, N. J., assignors, by mesne assignments, to Park Place Discount Co.

Dominion of Canada

319,170. **Catamenial Sack.** I. F. Brisache, New York, N. Y., U. S. A.

319,220. **Sanitary Appliance.** M. O. Stone, New York, N. Y., U. S. A.

319,256. **Abrasive Wheel.** Carborundum Co., assignee of R. C. Benner and W. G. Soley, co-inventors, all of Niagara Falls, N. Y., U. S. A.

319,295. **Self-Supporting Hosiery.** Mercury Mills, Ltd., assignee of H. G. Smith, both of Hamilton, Ont.

319,298. **Tractor Unit.** McNeil Boiler Co., Akron, assignee of G. I. Worley, deceased, in his lifetime of Willoughby, both in O., U. S. A.

319,353. **Traffic Marker.** M. E. Hartzler, Downers Grove, and T. H. Ferguson, Oak Park, co-inventors, and E. P. Romilly, Chicago, assignee of the said T. H. Ferguson, all in Ill., U.S.A.

319,522. **Vibration Insulator.** Rubber Shock Insulator Corp., Bridgeport, assignee of A. L. Riker, Fairfield, both in Conn., U. S. A.

319,718. **Storage Battery Separator.** Willard Storage Battery Co., assignee of C. C. Rose, both of Cleveland, O., U. S. A.

319,770. **Tire.** J. Noel, Ottawa, Ont.

319,850. **Paper Marking Roll.** Nekoosa-Edwards Paper Co., assignee of J. K. Vanatta, both of Port Edwards, Wis., U. S. A.

United Kingdom

357,419. **Tire Tread.** E. W. Coleman, Northolt Junction, Middlesex.

358,227. **Cable.** A. Arutunoff, Tulsa, Okla., U. S. A.

358,387. **Shock Absorber.** A. D. Draper and Bentley & Draper, Ltd., both of London, and H. C. Webb & Co., Ltd., Birmingham.

358,466. **Storage Battery Separator.** M. and P. Wilderman, both of Monte Carlo, Monaco.

358,616. **Pneumatic Tire.** Hibbert Pneumatic Cell Tyre Co., Ltd., Goulburn, N. S. W., Australia.
358,640. **Vehicle Laminated Spring.** B. L. Gordon, Philadelphia, Pa., U. S. A.
358,661. **Lifesaving Belt.** E. Hawley, Oughtibridge.
358,707. **Fire Escape Device.** H. L. Hill, London.
358,771. **Motor Car.** J. V. Martin, of Martin Aeroplane Factory, Garden City, L. I., N. Y., U. S. A.
358,857. **Vehicle Suspension System.** P. Wilmart, Brussels, Belgium.
359,034. **Apron.** E. and H. Steinberg, P. Leffmann, and A. Weyers (trading as firm of M. Steinberg), all of Cologne, Germany.
359,066. **Tennis Practicing Device.** M. T. Bunyan and L. Dauvé, both of Nanterre, Seine, France.
359,242. **Vibration Damper.** R. C. Cross and W. E. Harper, both of Bath.
359,282. **Bearing Yielding Support.** T. A. Bryson, Troy, N. Y., U. S. A.
359,325. **Ball.** Henley's Tyre & Rubber Co., Ltd., London, and J. Traxler, Surrey.
359,327. **Heel.** F. B. Dehn, London. (H. M. Tyner, New York, N. Y., U. S. A.)
359,377. **Ball Inflating Valve.** E. E. Tompkins, Haverford, Pa., U. S. A.
359,651. **Tire Valve.** A. Schrader's Son, Inc., Brooklyn, assignee of J. H. Clo, Baldwin, both in N. Y., U. S. A.
359,666. **Golf Club.** S. A. Marples, Chipstead, Surrey.
359,683. **Hair Curling Appliance.** A. Schulz, Heidelberg, Germany.
359,701. **Floor Scrubbing Machine.** A. Grundei, Langendorf, Germany.
359,714. **Pneumatic Tire.** P. Howe, Southend-on-Sea.
359,748. **Driving Belt.** C. C. Gates, Denver, Colo., U. S. A.
359,776. **Razor Blade Sharpener.** W. W. Carter, London.
359,784. **Rubber-covered Metal Door.** Metallges A. G., Frankfort a. M., Germany.
359,799. **Shaving Appliance.** H. T. Sargent, London.
359,843. **Golf Club.** A. G. Spalding & Bros. (British), Ltd., London, assignee of W. F. Reach, Springfield, Mass., U. S. A.
359,879. **Horseshoe.** E. Nygaard, Oslo, Norway.
359,913. **Sandal.** Soc. Franco-Belge Pour La Fabrication Du Caoutchouc Régénéré Socaré, Soc. Anon., Malines, Belgium.
359,917. **Pneumatic Tire.** Michelin & Cie., Clermont-Ferrand, Puy-de-Dome, France.
360,097. **Golf Club Grip.** G. Bleistein, Buffalo, N. Y., U. S. A.
360,104. **Nozzle.** G. Schoeni, Biel, Switzerland.
360,120. **Nozzle.** F. V. Walford, Grimsby.
360,151. **Ankle Bandage.** K. Rathgeber, Kirchhausen, Germany.
360,168. **Oscillating Bearing.** H. M. Hordern, London.
360,186. **Ashtray.** E. A. Bellow, St. Leonards-on-Sea.
360,223. **Wheel Shock Absorbing Drive.** W. W. Groves, London. (International Motor Co., New York, N. Y., U. S. A.)
360,269. **Golf Club Shaft.** A. G. Spalding & Bros. (British), Ltd., London, assignee of M. B. Reach, Springfield, Mass., U. S. A.
360,317. **Pneumatic Tire.** Goodyear Tire & Rubber Co., Akron, O., U. S. A.
360,411. **Wheel and Tire.** W. F. Ennis, Zamalek, Cairo, Egypt.
360,619. **Boot Welt.** P. E. Barbour, assignee of W. G. Barbour, both of Quincy, Mass., U. S. A.
360,884. **Cable.** International General Electric Co., Inc., New York, N. Y., U. S. A., assignee of Allgemeine Elektricitäts-Ges., Berlin, Germany.
360,924. **Retractive Switch.** H. A. Gill, London. (Automatic Signal Corp., New Haven, Conn., U. S. A.)
361,018. **Milk Churn.** T. S. Wallis and J. H. Howard, both of Bristol.
361,021. **Submarine Cable.** Siemens-Schuckertwerke A. G., Berlin, Germany.
361,072. **Tire Valve Dust Cap.** A. Schrader's Son, Inc., New York, assignee of J. Wahl, Rosedale, both in N. Y., U. S. A.
361,303. **Pneumatic Tire.** W. S. Kopczewski, Warsaw, Poland.
361,325. **Endless Belt Conveyer.** A. W. Ranger and H. Ranger, Ltd., both of London.
361,473. **Bathing Cap.** G. H. F. Symons, Salcombe, Devon.
361,662. **Flexible Tube.** G. Carpenter and Electric Hose & Rubber Co., Ltd., both of London.
362,620. **Sifting Apparatus.** C. W. G. Barton, London.

Germany

543,747. **Protective Sole.** G. Krumm, Cannstatt.
543,999. **Stocking.** Julius Rompler A. G., Zeulenroda.
544,281. **Scrubbing Brush.** C. Specht, Dortmund.
544,479. **Sole.** C. Augenstein, Karlsruhe.
544,647. **Tree Protection.** Schmidts Gummiwarenfabrik Arthur Schmidt A.G., Stade a. d. Elbe.
545,141. **Sole.** M. Theuerkorn, Zwickau i. Sa.
545,630. **Nipple.** O. Bahr, Cottbus-Madlow.

Designs

1,202,189. **Comb Exhibiting Device.** Rheinische Gummi & Celluloid-Fabrik, Mannheim-Neckarau.
1,202,373. **Brush.** G. Hellinger, Borgsdorf a. d. Nordbahn, and E. Hellinger, Berlin.
1,203,031. **Non-skid Sole.** Harburger Gummiwaren-Fabrik Phoenix A. G., Harburg-Wilhelmsburg.
1,203,053. **Mat.** Continental Gummi-Werke A. G., Hannover.
1,203,119. **Conveyer Belt.** Gottfried Hagen A. G., Koln-Kalk.
1,203,271. **Cycle Cover.** Harburger Gummiwaren-Fabrik Phoenix A. G., Harburg-Wilhelmsburg.
1,203,465. **Nipple.** Gustav Wellmann G. m. b. H., Hannover-Hainholz.
1,203,493. **Cycle Covers.** F. Schmitt, Mannheim.
1,203,504. **Anti-skid Device for Wheels.** P. Poser, Meissen.
1,203,644. **Steering Wheel.** Continental Gummi-Werke A. G., Hannover.
1,203,651. **Sponge.** E. Jacob, Bamberg.
1,203,799. **Perfumed Eraser.** Laufer Gummiwarenfabrik Schwerdt & Renner, Hannover.
1,204,042. **Pneumatic Tire Protector.** A. Hartrampf, Kl. Strehlitz in O. S.
1,204,126. **Anti-skid for Tires.** J. Gluck, Breslau.
1,204,440. **Horse-Shoe.** K. Bader, Moln-Bickendorf.

Trade Marks

United States

291,022. **Racial.** Sanitary sponges and diaphragms. Society for Constructive Birth Control and Racial Progress, London, England.
291,050. Word: **"Chevron"** in a fanciful design. Packing. Garlock Packing Co., Palmyra, N. Y.
291,051. **Minerva.** Tires and tubes. Tire Associates, Inc., New York, N. Y.
291,058. Circle containing the letters: **"L B"** and the words: **"Latex, Bonded."** Brake lining. United States Rubber Co., New York, N. Y.
291,076. **Copper King.** Belting. Pioneer Rubber Mills, San Francisco, Calif.
291,093. **Revolite.** Raincoats. Revolite Corp., New Brunswick, N. J.
291,119. **Rodeo.** Prophylactic articles. J. G. Gross, doing business as National Latex Co., Southgate, Calif.
291,130. **Silhouwelt.** Cement solvent or softener. United States Machinery Corp., Paterson, N. J., and Boston, Mass.
291,147. **Sanitred.** Underlay for rugs. H. D. Butts, Chicago, Ill.
291,163. **Chex.** Prophylactic articles. Chex Products Co., Charlotte, N. C.
291,210. Word: **"Nighthawk," written horizontally and vertically and crossing each other, in a fanciful design.** Prophylactic articles. W. H. Reed, doing business as W. H. Reed & Co., Atlanta, Ga.
291,241. **Royalite.** Flooring. United States Rubber Co., New York, N. Y.
291,242. **Covulc.** Wire mesh embedded in sheet rubber. P. C. Hitchcock, Boston, Mass.
291,253. Label containing a fanciful design and the words: **"Improved, Shaler, Rapid, Hot Patches."** Tires and tire repair kits. Shaler Co., Waupun, Wis.
291,341. Representation of a golf ball. Golf balls. St. Mungo Mfg. Co. of America, Newark, N. J.
291,395. **DuPrene.** Rubber-like composition. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
291,465. **Acto.** Tires and tubes. Atlas Supply Co., Newark, N. J.
291,469. **Bardex.** Dispensing agent and /or antioxidant. Barrett Co., New York, N. Y.
291,516. **Exact.** Impression compound. S. S. White Dental Mfg. Co., Philadelphia, Pa.
291,551. Double lined circle containing the word: **"Durable."** Druggists' sundries. Seiberling Latex Products Co., Akron, O.
291,593. **Keldur.** Insulating sheets and supports. International Products Co., Milwaukee, Wis., assignor to Keldur Corp., Newark, N. J., a corporation of N. Y.
291,601. **Sandalettes.** Footwear. W. Greilich & Sons, Inc., Brooklyn, N. Y.
291,618. **Paragold.** Gloves. Seamless Rubber Co., Inc., New Haven, Conn.
291,620. **Anotex.** Corsets. Dunlop Rubber Co., Ltd., Ft. Dunlop, England.
291,632. **Vigasco.** Gasket cement. Victor Mfg. & Gasket Co., Chicago, Ill.
291,684. **Atlas.** Golf balls. Atlas Supply Co., Newark, N. J.
291,744. **Metro.** Combs. Bolta Rubber Comb Sales Corp., New York, N. Y.
291,745. **Campus Queen.** Footwear. National Bellas Hess Co., Inc., New York, N. Y.

EDITOR'S BOOK TABLE

Book Reviews

"Bulletin of the National Research Council No. 86. Bibliography of Bibliographies on Chemistry and Chemical Technology." Second Supplement, 1929-1931. Compiled by Clarence J. West and D. D. Berolzheimer for Research and Information Service, National Research Council, Washington, D. C., 1932. Paper, 150 pages, 6¾ by 9¾ inches. Price $1.50.

This compilation will be found useful by industrial chemists, engineers, and technologists because of its scope and completeness. It includes many references to the literature of rubber.

"Kolloidchemische Technologie." A Handbook of the Colloid-Chemical Point of View in the Chemical Industry and Technology. Edited by Raph. Ed. Liesegang. Second completely revised edition. Paper or half-leather, in one volume or 13 parts; 1,085 pages, 376 illustrations, 2 plates, numerous tables, 7½ by 10⅜ inches. Published by Theodor Steinkopff, Dresden and Leipzig, Germany, 1931.

Although the first edition of this work appeared in 1927, it became necessary to publish a second edition in the summer of 1931. The entire work has been thoroughly revised and brought up-to-date, and various new subjects, as "Plasticity and Plastification," have been included. The work is divided under 37 different heads, each contribution coming from an expert, and includes: "Active Carbons" by W. Mecklenburg; "Plasticity and Plastification" by J. Obrist; "Plastic Masses," O. Manfred; "Rubber," E. A. Hauser; "Electrotechnical Insulating Materials," H. Stager; and "Electroosmosis," E. Mayer. There is also a concluding chapter by Mr. Liesegang, which is in the nature of a guide to the use of the book and an exposition of his introductory remarks:

"The reader will notice how the application of a certain colloid-chemical conception is still in its infancy in one field; whereas in another it was in use long before a formal colloid-chemistry existed. There is an immediate inducement to learn from the latter in favor of that which has been treated in such step-motherly fashion. This is often possible, however unrelated two fields may appear to be."

The work is supplied with an index of authors and an alphabetical index of subjects, besides a detailed table of contents.

"Athco Athletic Shoes." The Athletic Shoe Co., 916 N. Marshfield Ave., Chicago, Ill. In this 16-page booklet appear illustrated descriptions of footwear for baseball, football, track, golf, bowling, boxing, gymnasium work, dancing, general sports, tennis, basketball, and skating as well as of leather boots and house slippers.

New Publications

"Royle Perfected Tubing Machine No. 4 Worm Geared." John Royle & Sons, Paterson, N. J. This bulletin, No. 386, illustrates and describes the 6-inch cylinder machine excellently adapted to large production of important classes of rubber goods such as inner tubes, treads, heels, jar rings, fire hose linings, cable coverings, and other items of similar size and range, also for straining crude and compounded rubber.

"The 'Last Word' in Hydro-Pneumatic Accumulators." John Robertson Co., 121-137 Water St., Brooklyn, N. Y. This 4-page bulletin contains a description of the general and the mechanical features of the Robertson hydro-pneumatic accumulator. Sectional views are shown of the mechanism, also a diagrammatic view of its assembly with air compressor, air storage tank, accumulator, and hydraulic pump, together with specifications and capacities. Presses and other lead encasing equipment are mentioned and pictured in this bulletin.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

Number	Commodity	City and Country
*†56,447	Tires and tubes	Sao Paulo, Brazil
†56,448	Rubber sundries	Brussels, Belgium
*56,452	Old tires	Chefoo, China
†56,488	Tires	Brno, Czechoslovakia
†56,489	Tires and tubes	Prague, Czechoslovakia
†56,490	Bathing caps, shoes, beach bags, sea toys, and bathing belts	Alexandria, Egypt
*†56.491	Tires	Ujjain, India
‡56,492	Rubber-soled canvas shoes	Panama City, Panama
†56,513	Bathing caps, shoes, beach bags, sea toys, and bathing belts	Alexandria, Egypt
‡56,599	Rubber sheets and vulcanizing rubber	The Hague, Netherlands
*56,600	Scrap rubber	Lisbon, Portugal
*56,601	Shoes	Prague, Czechoslovakia
‡56,618	Automobile top material	The Hague, Netherlands
*56,668	Boots	Milan, Italy
*56,669	Druggists' sundries	Montreal, Canada
*†56,701	Waist belts	Medan, Sumatra
‡56,717	Druggists' sundries	Toronto, Canada
*56,757	Orthopedical plates	Hamburg, Germany
*†56,769	Bathing caps and shoes	Prague, Czechoslovakia
†56.780	Barber shop supplies	Toronto, Canada
†56,804	Surgeons' gloves and hospital sundries	Rio de Janeiro, Brazil
*56,821	Automobile floor mats and radiator hose	Berlin, Germany
*†56,866	Belting, bottles, and carboys	Prague, Czechoslovakia
*56,867	Sanitary appliances	Vienna, Austria
†56,902	Toy balloons	Port of Spain, Trinidad
†56,912	Automobile mats and runners	Prague, Czechoslovakia
*56,938	Ground rubber	Vancouver, Canada
*†56,939	Footwear	Istanbul, Turkey

*Purchase. †Agency. *†Purchase and agency. ‡Either.

The Vanderbilt News. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. The January-February, 1932, issue of this publication is entirely devoted to a "Glossary of Terms Used in Rubber Technology." While completeness is not claimed for the list, over 700 definitions are given covering chemical, physical, electrical, textile, X-ray, and botanical terms related or applicable to rubber technology.

"Bristol's Recording Absolute Pressure Gage." Catalog No. 1011, Supplementary to No. 1010. The Bristol Co., Waterbury, Conn. This 12-page catalog describes and illustrates with charts, diagrams, and photographs the essential features of this gage designed for use where the knowledge of absolute pressure is necessary.

"The Tag-Mono Indicator-Recorder Catalog No. 1025." C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. In this catalog the manufacturer illustrates and describes the duplex and single types of CO_2 recorders, clearly showing the construction, operation, and application of these instruments. Numerous other Tag products for the power plant are pictured on the inside back cover of this 16-page booklet.

"Peerless Folding Furniture from 'The House of Tucker.'" Tucker Duck & Rubber Co., Ft. Smith, Ark. In this 20-page booklet, illustrated in black and white and also in colors, the manufacturer describes a wide array of folding chairs, cots, and tables suitable for home, office, and outdoor use.

"Artex. Table Tops. Counter Tops. Stool Tops. Panels. Aprons. Bases." The Aetna Rubber Co., Ashtabula, O. This circular illustrates in exact colors and describes by detailed diagrams and text this molded rubber topping that serves so many useful purposes.

Miner Calendar and Catalog. The Miner Rubber Co., Ltd., Granby, P. Q., Canada. The calendar pad from March, 1932, to February, 1933, is centered between an attractive picture of Pine Tree Farm, property of President W. H. Miner, and a pocket for the company's catalogs. Included among the monthly sheets of the pad are colored illustrations and descriptions of Miner rubber and canvas footwear and rubber clothing, and some order blanks for dealers.

"Rubber Latex." Letter Circular LC, 321. Department of Commerce, Bureau of Standards, Washington, D. C., February 25, 1932. Mimeographed, 35 pages, 8 by 10⅝ inches.

This Letter Circular gives general information on rubber latex and directs the reader to sources from which special or detailed information may be obtained. Part 1 is a brief discussion of the production, composition, and properties of latex and its use in manufacture. Part 2 is a list of recent publications on latex, covering the period 1927-1931.

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Distributor
S. H. Stewart Co.
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Los Angeles, Cal.

Market Reviews

Crude Rubber

THE final collapse of the Anglo-Dutch negotiations on restriction was responsible for a collapse in the market which carried prices down as low as 3¢. The parleys are finished, according to official announcement, and will not be renewed at the present time.

The results of this failure to come to an agreement on a problem from which the industry expected relief may have either of 2 effects: it will depress prices further, or it will improve them.

Those on the bear side expect to see 2½¢ rubber. They feel that much liquidation is still to be uncovered both here and abroad, and when these accounts are liquidated, prices will be carried downward.

Those who figure on higher prices say that the low, ruinous price of rubber will force many small estates to the wall, and as they are removed from production, shipments will gradually taper off, and the burdensome world stocks will slowly be reduced. One man's guess is as good as another's.

The low rate of automobile production has been disappointing. Buyers are not making their usual spring purchases, and factories have been forced to curtail output in line with the slack demand. It was expected that Ford's entry into active production would stimulate the market, but he has adopted his usual tactics, and no one knows when he will present his new models.

In the New York Outside Market business has been spotty. With present prices brokers and dealers feel that they are running charitable institutions. They can make no money at these levels; offerings, consequently, are limited. Buyers have been hesitant about accumulating stocks because of the uncertainty of prices and of business in general. The cessation of the restriction conversations removes one uncertainty from the market, and this condition, at least, should enable buyers to shape their buying policies more definitely.

Week ended February 27. Several new all-time low records were again established this week. The February contract, which had established a low of 3.86¢ the week before, slid successively to 3.75¢, 3.60¢, and on the last day of trading, to 3.57¢.

The March contract was also weak. It slid to 3.90¢, then to 3.81¢, 3.68, 3.62, and closed the week at 3.64 to 3.70¢. The total changes for the week amounted to from 22 to 31 points on the downward side.

The March position, at 3.64 to 3.70¢, compared with the previous week's close of 3.95; May closed at 3.78, compared with 4.08; July was 3.96 against 4.20; September, 4.08 against 4.30; December, 4.30 against 4.52; and January, 4.39 against 4.62.

Prior to notice day there were heavy switching operations by speculators who sold March and bought later positions, and trade buyers stepped into the market only at substantial price concessions.

The liquidation was prompted by advices from Amsterdam cables, which said that negotiations on the question of restriction have been started at The Hague between representatives of the Department of Colonies and the Dutch East Indian government. The report declared that it was common knowledge that the Dutch East Indian government opposed restriction efforts, and with the opposition of the large planters, traders here felt that even the poor financial condition of the colonial government would not be able to offset this combined opposition.

The course of the market clearly indicated that traders in the last 2 weeks have liquidated long accounts held on the hope of action on restriction, and the prevailing feeling is that no legislation or plan will be adopted. This view, of course, may be offset, since negotiations are still in process.

Announcement on Monday that further reductions in tire prices were being made by large manufacturers was interpreted as bearish. Dealers and prominent leaders in the industry strongly protested the move, maintaining that it was detrimental to the independent tire dealer. The cuts were only on truck tires, but it was felt that this move simply presaged a similar cut on passenger tires within the next few months.

RUBBER BEAR POINTS

1. **The Anglo-Dutch restriction discussions are definitely off.**
2. **Automobile production in February was 118,559 units, 8.7% less than in January and 48% less than in February, 1931.**
3. **Buying of automobiles by the public has not registered the usual seasonal increase.**
4. **Shipments of pneumatic casings for January were 3,253,086 units, an increase of 17.0% over December, but 13.1% below January, 1931.**
5. **Production of tires for January was 31.0% over December, but 5.8% below last January.**
6. **Shipments by Malaya during February were 42,008 tons, against 42,638 tons in January and 41,951 tons in February, 1931.**
7. **March exports from Malaya are expected to be about 42,000 tons.**
8. **Total visible supply of rubber is about 575,000 tons, over 8 months' supply.**
9. **Great Britain has more than a year and a half's supply of rubber on hand.**

RUBBER BULL POINTS

1. **Automobile manufacturers are keeping output on a level with demand.**
2. **Dealers' stocks in the Far East were 51,495 tons at the end of February against 52,723 tons at the end of January.**
3. **Pneumatic casings on hand January 31 were 1.8% over December, but 11.7% below January 31, 1931.**
4. **Exports from Ceylon were 4,462 tons against 4,568 tons during January and 6,341 tons in February, 1931.**
5. **Net imports to the United States for February were 30,546 tons, against 31,298 in January, and 36,645 in February, 1931.**
6. **Consumption of crude rubber in the United States during February was 30,012 tons against 27,962 in January and 28,797 in February, 1931.**

January production of automobiles was the lowest of any January since 1922. Output was 123,075 units compared with 123,973 in December and 178,344 in January, 1931. A total of 98,706 passenger cars was produced against 96,753 in December. This increase was due largely to the introduction of spring models.

The actuals market was depressed as far as prices go, a low of 3⅝¢ being set. The usual amount of scale-down buying was evident, but although the amount of rubber changing hands was in fairly large quantity, there is no money in such transactions for brokers.

Spot rubber in the Outside Market closed at 3⅝ to 3¾¢, against 3⅞ to 4¢ the previous week. February ribbed smoked sheets were 3⅝ to 3¾ against 3⅞ to 4; March was 3⅝ against 3⅞; July-September, 4-1/16 against 4⅜; October-December, 4¼ against 4-9/16. First latex was 4⅝ against 4-11/16; crepe, 3¼ against 3½.

The disappointing news on restriction sent prices off, with prices soft at the close of the week.

Week ended March 5. Although prices were stronger at the week-end than at any other time in the past week, the continued drop in values can only be characterized as deplorable. The March contract slid to 3.35¢, and broke even further to 3.31¢. At one time on Wednesday prices for all deliveries were below 4¢.

On firmness in London and Singapore the market did better at the close of the week, but even so prices were down from 6 to 11 points for the period. March closed at 3.58¢, compared with 3.64 last week; May was 3.72 against 3.78; July, 3.82 against 3.96; September, 3.97 against 4.08; December, 4.18 against 4.30; and January, 4.28 against 4.39.

Evidences of the effect of the low price were emphasized from several different sources during the week. Part of the large deficit shown in the Dutch East Indies budget was undoubtedly due to the decline in rubber values. What was estimated to be a deficit of 10,000,000 florins for 1931 turned out to be a deficit of 162,000,000 florins.

Hopes of stabilizing crude prices were given a severe blow when M. Luytjes, a prominent official of the Dutch East Indies Government who had been called to Holland to confer on a restriction proposal, declared his opposition to restriction of rubber production under government supervision.

M. Luytjes conferred with the director of the trade section of the Ministry of the Colonies and expects to confer shortly with leaders of the antirestriction movement. He expressed the hope that the

government would soon make a pronouncement on the matter.

The Malayan report showed that shipments were somewhat lower, but still far in excess of needs. For February shipments amounted to 42,008 tons, against 42,638 tons in January, and 41,951 tons during February, 1931. Ceylon's exports in February were 4,462 tons against 4,568 tons during January, and 6,341 tons during February, 1931.

The Rubber Division of the Department of Commerce issued its report on rubber consumption for 1931, saying that takings were at levels comparable with previous years. Foreign takings were almost doubled to the Soviet Union, rising from 16,000 to 30,000 tons. Australia, Belgium, the United Kingdom, Austria, and Argentina increased their consumption, while France decreased hers.

"The outlook for increased rubber consumption in 1932 seems but little more hopeful from the angle of either old or new uses than it did in 1931," says the report. "Recent annual statements of most estate companies show that operations were conducted at a loss during the past year. In periods of price firmness during 1931 native producers both in Malaya and the Netherland India responded quickly with increased outputs."

Business in the Outside Market was in considerable volume, but the margin of profit is so narrow that much dissatisfaction was expressed. Holders, therefore, were not inclined to let their rubber go at sacrifice prices which prevailed early in the week. The uncertain prices are making the sundries manufacturers cautious, for with every drop in the crude price they must suffer an inventory loss. So they are buying on a hand-to-mouth basis.

Spot ribbed smoked sheets were quoted at 3-9/16¢, against 3¾ the previous week. Thick latex was 4-9/16 against 4⅝; rolled brown crepe was 3-9/16 against 3¼; and upriver fine was 5¼ against 5.

Week ended March 12. The rise and the fall of sterling influenced the rubber market somewhat in the last week as dealers tried to bring prices in line with those abroad. Then there were several cables regarding the restriction negotiations which also had a bearing on prices. On Friday, when the market had its best gain of the week, 8 to 19 points, the advance was due to covering by shorts who feared a favorable restriction report.

The average trend of prices was a loss of from 2 to 10 points. April closed at 3.62¢, against 3.65 last week; May was 3.62 against 3.72; September, 3.93 against 3.97; December, 4.09 against 4.18; and January, 4.18 against 4.28.

The first restriction cable received said that conferences between Great Britain and Holland were to be resumed. M. Luytjes, in an official capacity, together with a committee of Dutch rubber growers who favor restrictions, sailed for London to confer with the British advocates of a regulation plan. Mr. Luytjes was ordered, according to the cable, to point out the difficulties confronting the Dutch Government in coming to a decision concerning a rubber restriction plan.

Another cable read that these conferences had not been successful. It was stated that Mr. Luytjes was an opponent of restriction, but that he had not publicly expressed the opinion that restriction was not advisable.

The last one, on Friday, said that in London the understanding was that negotiations were strictly informal and that the representatives of the Dutch rubber interests had already returned to Holland. Although there is still the greatest secrecy surrounding the conferences, the general belief was that results would be inconclusive. Jonkheer De Graaf, Dutch Colonial Minister, announced in the lower chamber of Parliament at The Hague that in a short time a definite decision on restriction would be taken. Traders now expect that this long-waited announcement will be forthcoming about March 15.

The National Automobile Chamber of Commerce estimated February output of motor cars to be 118,559 units against an output of 119,344 units in January and 219,940 in February, 1931. This figure represents a decline of 3.7% from January and 48% from February last year.

In the Outside Market business was stalemated. The sales made were largely speculative, and at the low prices prevailing dealers are loath to offer actual rubber.

A price of 3-11/16¢ was being asked for ribbed smoked sheets at the end of the week, compared with 3-9/16 asked last week. Bids were 2/16 below the asking price. Latex closed at 4⅝¢ against 4-9/16 last week; rolled brown crepe, 3-5/16 against 3-3/16; and upriver fine spot was 5¼ unchanged.

Dealers are marking time until the uncertainty over restriction negotiations is settled by a final announcement.

Week ended March 19. March 15 came and went, but the "definite announcement" expected on the progress in the restriction discussions was not forthcoming. Another conference was reported at The Hague, but no news emanated from behind the locked doors.

The effect on the market was disastrous. April and May contracts sold down to 3.27¢, new all-time low marks, and the general list was down from 34 to 47 points. The March contract closed at 3.30¢, compared with 3.64 at the close of last week; May was 3.27 against 3.62; July, 3.36 against 3.77; October, 3.52 against 3.99; December, 3.65 against 4.09; and January, 3.72 against 4.18.

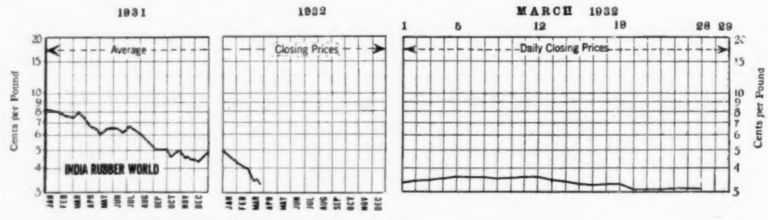
The Rubber Manufacturers' Association in its report gave February rubber consumption at 30,012 long tons as compared with 27,962 long tons for January, 1932, an increase of 7.3% which is contrary to the usual seasonal decline of 3.5%. Consumption for February a year ago was 28,797 long tons.

Imports were put at 30,546 tons for February, a decrease of 2.4% under January and 16.6% below February, 1931. Domestic stocks on February 29 were put at 322,117 long tons, compared with 322,860 at the end of January, or 51.3% above stocks at the end of February last year.

In all the discussion about restriction it often seems to be conceded that the native grower is responsible for the overproduction of rubber and, consequently, for the low prices. An editorial in the *Journal of Commerce* on Friday, punctures this theory somewhat.

"Denied a Government supervised restriction plan," says the editorial, "the organized British and Dutch estate owners complain that the native rubber grower has brought the industry to its present ruinous position through indiscriminate planting of new acreage and intensified production.

"The ninth report on Dutch Native Rubber prepared by the Netherlands East Indies Government refutes this charge, so



New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets

New York Outside Market—Spot Closing Rubber Prices—Cents Per Pound

	February, 1932 22*	23	24	25	26	27	29
Ribbed Smoked Sheet	...	3 7/8	3 13/16	3 11/16	3 11/16	3 11/16	3 9/16
No. 1 Thin Latex Crepe	...	4 11/16	4 3/4	4 11/16	4 11/16	4 11/16	4 9/16
No. 1 Thick Latex Crepe	...	4 3/4	4 13/16	4 3/4	4 3/4	4 3/4	4 11/16
No. 1 Brown Crepe	...	3 5/8	3 9/16	3 1/2	3 1/2	3 1/2	3 7/16
No. 2 Brown Crepe	...	3 9/16	3 1/2	3 7/16	3 7/16	3 7/16	3 5/16
No. 2 Amber	...	3 5/8	3 9/16	3 1/2	3 1/2	3 1/2	3 7/16
No. 3 Amber	...	3 9/16	3 1/2	3 7/16	3 7/16	3 7/16	3 3/8
No. 4 Amber	...	3 1/2	3 7/16	3 3/8	3 3/8	3 3/8	3 1/8
Rolled Brown	...	3 3/8	3 5/16	3 5/16	3 5/16	3 5/16	3 1/8

	March, 1932 1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19
Ribbed Smoked Sheet	3 3/8	3 7/16	3 1/2	3 9/16	3 5/8	3 5/8	3 5/8	3 9/16	3 9/16	3 5/8	3 5/8	3 1/2	3 7/16	3 5/16	3 1/4	3 1/4	3 1/4
No. 1 Thin Latex Crepe	4 3/8	4 7/16	4 1/2	4 9/16	4 5/8	4 5/8	4 5/8	4 9/16	4 9/16	4 5/8	4 5/8	4 1/2	4 9/16	4 3/8	4 5/16	4 5/16	4 5/16
No. 1 Thick Latex Crepe	4 1/2	4 9/16	4 5/8	4 11/16	4 3/4	4 3/4	4 5/8	4 9/16	4 5/8	4 11/16	4 5/8	4 9/16	4 9/16	4 3/8	4 5/16	4 5/16	4 5/16
No. 1 Brown Crepe	3 5/16	3 1/4	3 5/16	3 3/8	3 7/16	3 7/16	3 1/2	3 7/16	3 7/16	3 7/16	3 3/8	3 5/16	3 5/16	3 3/16	3 1/8	3 1/8	3 1/8
No. 2 Brown Crepe	3 1/8	3 3/16	3 1/4	3 5/16	3 3/8	3 3/8	3 7/16	3 3/8	3 3/8	3 3/8	3 5/16	3 1/4	3 1/4	3 1/8	3 1/16	3 1/16	3 1/16
No. 2 Amber	3 5/16	3 1/4	3 5/16	3 3/8	3 7/16	3 7/16	3 1/2	3 7/16	3 7/16	3 7/16	3 3/8	3 5/16	3 5/16	3 3/16	3 1/8	3 1/8	3 1/8
No. 3 Amber	3 3/16	3 3/16	3 1/4	3 5/16	3 3/8	3 3/8	3 7/16	3 3/8	3 3/8	3 3/8	3 5/16	3 1/4	3 1/4	3 1/8	3 1/16	3 1/16	3 1/16
No. 4 Amber	3 1/16	3 1/8	3 3/16	3 1/4	3 5/16	3 5/16	3 1/4	3 3/16	3 1/4	3 1/4	3 3/16	3 3/16	3 1/8	3 1/16	3	3	3
Rolled Brown	3 1/16	3 1/8	3 3/16	3 1/4	3 5/16	3 5/16	3 3/16	3 1/8	3 3/16	3 3/16	3 1/8	3 1/8	3	3	2 15/16	2 15/16	2 15/16

*Holiday.

far as 1931 is concerned. The Dutch natives have reduced their production of rubber more than any other group except the producers of British India, who contribute only a small percentage of the annual world supply. The report shows that in 1930 natives produced 60% of potential production, and in 1931 only 45% of the potential, although output capacity rose at the same time from 150,000 tons in 1930 to 200,000 tons in 1931."

Automobile production made a new low for the year in the week ended March 12, when output was estimated at 34,587 cars and trucks, against 35,461 for the preceding week, and 60,709 for the corresponding week last year. Ford production was a bit higher, but assembly of the new 8 has not yet been started at this writing.

The other companies are endeavoring to keep their stocks as light as possible. Even though the spring buying season is at hand, manufacturers are not expected to step up production, preferring to keep their dealers going with as few cars as possible.

Malayan shipments for the first half of March were 20,000 tons, with the total for the month estimated at 42,000 tons, compared with 42,008 tons in February of this year.

Outside prices eased off with the general list, but dealers were asking a fraction above the market, with bids being raised to meet the asking price. With prices at such extremely low levels, dealers are not anxious to sell rubber. They can make no money, and they do not relish the idea of serving as a clearing house for the benefit of manufacturers.

Ribbed smoked sheets were 3-5/16¢ against 3-11/16 a week ago; first latex was unchanged at 4⅝; rolled brown crepe was 2-15/16 against 3-5/16; upriver fine paras was 5¼ unchanged.

Week ended March 24. A new all-time low record of 3.01¢ for the March contract was established when the official announcement was made that the negotiations between the British and the Dutch had definitely broken down. The announcement said that the 2 governments find it impossible under present conditions to operate an international scheme guaranteeing effective regulation of production and export of rubber.

In London, Rubber Trust shares fell 2¼ s. on the Stock Exchange to 9¼ s. Anglo-Dutch Rubber lost 10½ d. and was quoted at 7 s. Spot rubber opened there at a new low of 1⅞ d. a pound. Singapore prices were off slightly also although the news had been partly discounted there.

In our own market the liquidation which resulted in new low prices was said to be that of speculative accounts which had been held for some time. The same drop in prices resulted following the suspension of the Stevenson restriction scheme, it was recalled. It also was apparent, according to London opinion, that the unsound Stevenson scheme was partly responsible for the troubles afflicting the rubber industry at present.

Talking of the scheme, the London *Times* financial editor says, "It gave unhealthy stimulus to extensions and developments, particularly to the Dutch East Indies, and probably it is due to that more than to any other cause that such vast areas have been developed by Asiatics in the outer concessions and in the Dutch East Indies."

The market rose from its lows, and before the week-end holiday was much firmer. Thursday night closing prices were: March 3.20, against 3.30 at the close of last week. May was 3.13 against 3.27; July, 3.20 against 3.36; December, 3.48 against 3.65; and January, 3.55 against 3.72.

Business was spotty in the Outside Market, with dealers assuming a waiting attitude. March closed at 3⅛ against 3-5/16; rolled brown crepe was 2¾ against 2-15/16; first latex, 4½ against 4⅝; and No. 3 amber was 3 against 3-3/16.

The market opened on March 28, when the price of ribs was 3⅛¢. In London the rubber market was closed because of a holiday.

Price Differentials

Price differentials between the various grades of Hevea plantation rubber which shall prevail on all deliveries against the new "A" contracts, for April, 1932, follow:

No. 2 crepe (thick or thin) at 1 point;
No. 2 ribbed smoked sheets at 8 points;
No. 3 ribbed smoked sheets at 16 points;
No. 4 ribbed smoked sheets at 28 points;
No. 5 ribbed smoked sheets at 50 points.

Limit of allowance on No. 2 crepe at 25 points; allowance on rubber delivered in bales at 13 points.

New York Quotations

Following are New York outside market rubber quotations in cents per pound for one year ago, one month ago, and March 28.

Plantations	Mar. 26, 1931	Feb. 24, 1932	Mar. 28, 1932
Rubber latex....*gal.*	75	51	51
Sheet			
Ribbed, smoked, spot	7⅛/7¼	4 /4-1/16	3⅛
Apr.-June	7¼/7⅜	....	3⅛
July-Sept.	7½	4⅛/4-3/16	3⅜
Oct.-Dec.	7¾/8	4⅜	3½
CREPE			
No. 1 Thin latex, spot	7⅜/7½	4¾/4⅞	4⅜
Apr.-June	7⅝/7¾	....	4⅜
July-Sept.	7⅞/8	4⅞	4⅝
Oct.-Dec.	8⅛/8¼	5-1/16/5⅛	4¾
No. 2, Amber, spot	7 /7¼	3-13/16/3⅞	3-1/16
Apr.-June	7¼/7⅜	....	3-1/16
July-Sept.	7⅜/7½	3-15/16/4	3-5/16
Oct.-Dec.	7⅝/7¾	4-3/16	3-7/16
No. 3 Amber, spot..	6⅞/7	3¾/3-13/16	3
No. 1 Brown.....	7	3-13/16/3⅞	3-1/16
No. 2 Brown.....	6¾/6⅞	3¾/3-13/16	3
Brown, rolled	6½/6⅝	3½	2⅞
PONTIANAK			
Bandjermasin	5	5½	5
Pressed block	11	8	7½
Sarawak	5	5½	5
PARAS			
Upriver fine	8½/8¾	5¾	5⅜
Upriver fine	*11¾	*8¾	*8¼
Upriver coarse	5¼/5½	†2½	†2½
Upriver coarse	*8¾	*5	*4¼
Islands, fine	8¼/8½	†5	†5
Islands fine	*11½	*8½	*8
Acre, Bolivian, fine	8⅞	6	5½
Acre, Bolivian fine.	*12	*9	*8½
Beni, Bolivian	8¾/9	6	5½
Madeira, fine	8½/8¾	†5¾	†5½

CAUCHO	Mar. 26, 1931	Feb. 24, 1932	Mar. 28, 1932
Upper ball	5	†2½	†2½
Upper ball	*8¾	*5	*4¼
Lower ball	4¾	†2	†2
Manicobas			
Manicoba, 30% guar.	6	†4½	†2½
Mangabiera, thin sheet	6	†4½	†2½
Guayule			
Duro, washed and dried	14	13	13
Ampar	15	14	14
Africans			
Rio Nuñez	....	8	8
Black Kassai	....	8	8
Manihot cuttings...	....	4	4
Prime Niger flake..	....	15	15
Accra flake	....	15	15
Gutta Percha			
Gutta Siak	12	8¼	8
Gutta Soh	20	16½	17
Red Macassar.....	1.75	2.00	1.50
Balata			
Block, Ciudad Bolivar	30	18	17
Colombia	....	18	....
Manaos block	33	18	17
Surinam sheet	55	35	35
Amber	58	38	37

*Washed and dried crepe. Shipment from Brazil.
†Nominal.

New York Outside Market (Continued)

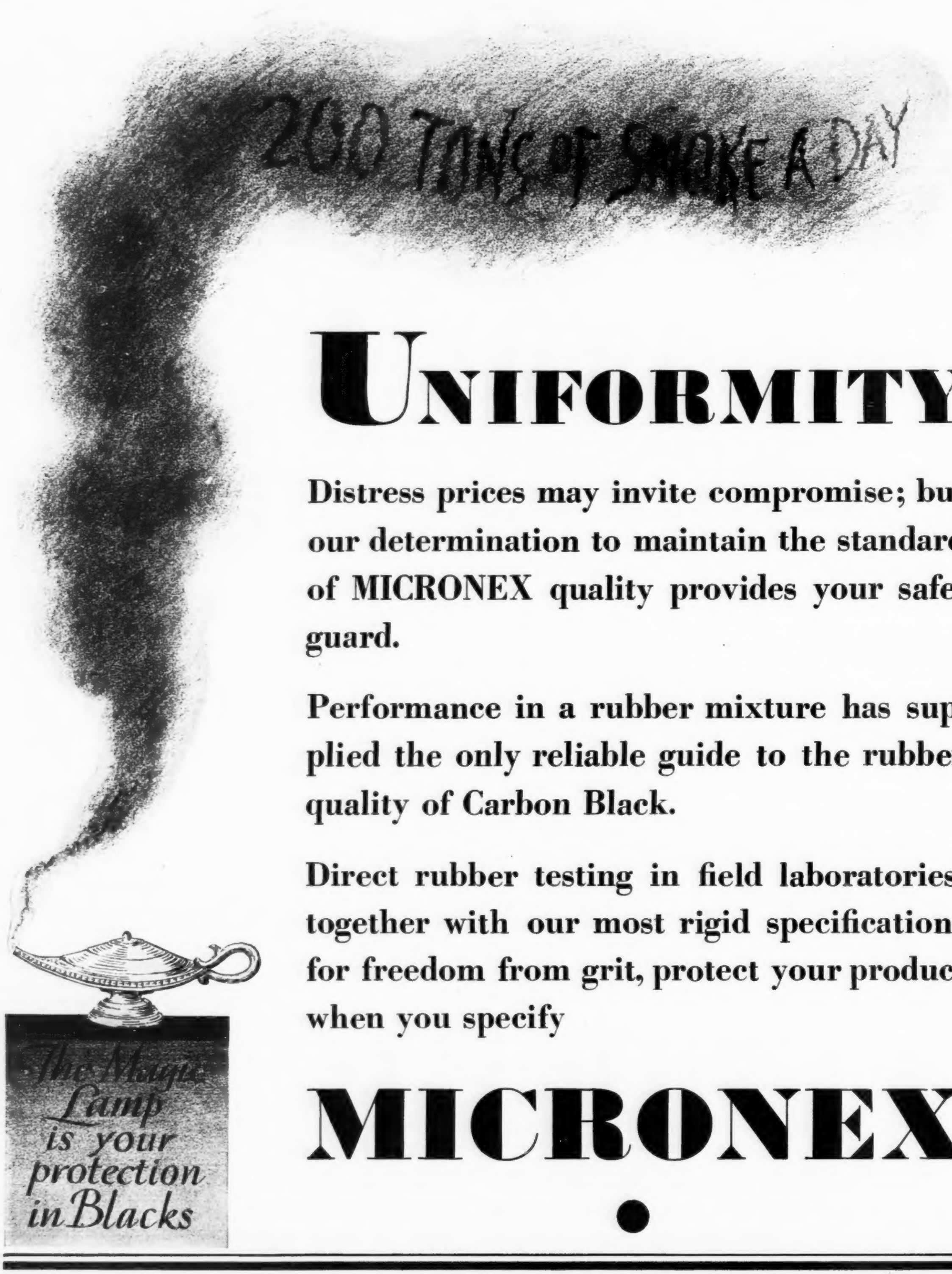
	March, 1932					
	21	22	23	24	25*	26*
Ribbed Smoked Sheet	3-1/16	3-1/16	3-1/16	3-1/16	...	...
No. 1 Thin Latex Crepe	4-3/16	4-3/16	4-3/16	4¼	...	...
No. 1 Thick Latex Crepe	4¼	4¼	4¼	4-5/16	...	...
No. 1 Brown Crepe	2⅞	2⅞	2⅞	2-15/16	...	...
No. 2 Brown Crepe	2-13/16	2-13/16	2-13/16	2⅞	...	...
No. 2 Amber	2⅞	2⅞	2⅞	2-15/16	...	...
No. 3 Amber	2-13/16	2-13/16	2-13/16	2⅞	...	...
No. 4 Amber	2-11/16	2-11/16	2-11/16	2¾	...	...
Rolled Brown	2-9/16	2-9/16	2-9/16	2⅝	...	...

*Holiday.

Low and High New York Spot Prices

	March		
PLANTATIONS	1932*	1931	1930
Thin latex crepe......	$0.04-3/16/$0.04⅝	$0.07⅛/$0.08⅝	$0.15⅜/$0.16¼
Smoked sheet, ribbed...	.03-1/16/ .03⅝	.06⅞/ .08⅜	.14⅞/ .15¾
PARAS			
Upriver fine	.05 / .05¼	.09 / .09⅜	.16¾/ .....
Upriver coarse	†	.08 /	.08¾/ .....
Upper caucho ball.....	†.03 /	.08 /	.08½/ .....

*Figured to March 26, 1932.
†Nominal.



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BINNEY & SMITH CO.
41 EAST 42ND STREET, NEW YORK, N. Y.

Compounding Ingredients

TIRE production is at rather low ebb because of reduced output of the automobile industry. It probably does not exceed 40% of capacity as a total. Footwear and insulated wire output are also much below the usual seasonal rate. Mechanicals, heels, and clothing are fairly active.

ACCELERATORS. The growing demand, now in progress, for materials suitable for vulcanizing rubber without sulphur represents a new development in rubber compounding. Vulcanizing agents that could not be employed successfully 5 years ago are now entirely practicable in the improved rubber working technique.

AGE RESISTERS. Effective March 1, 1932, those antioxidants that are most largely used in rubber work were reduced in price. Ton lots have been cut from 57 to 54¢ per pound and less than ton lots from 61 to 58¢ per pound.

CARBON BLACK. Slight improvement in demand for carbon black is noted, but it falls far short of what was anticipated by tire manufacturers, based on their expectation of tire orders from the automobile industry. The price continues steady for carload lots at 3¢ a pound f.o.b. Texas.

LITHARGE. Rubber makers' demand for litharge is slow. Commercial grade in casks is steady at 5¾¢ a pound.

LITHOPONE. Demand is fair; while prices are steady and unchanged.

SOFTENERS. Prices for the various materials of this class for rubber work are steady, and demand fair, particularly for degras, stearic acid, and petrolatum.

SOLVENTS. Both heavy and light grades hold fair in demand and steady in price.

ZINC OXIDE. The demand from the rubber industry has shown a small tendency to increase since the beginning of the year. A reduction of ¾¢ a pound has become effective on carload lots of American process oxide except on the 35% leaded grade. The latter is not, of course, a commonly used grade for rubber work.

New York Quotations

March 26, 1932

Prices Not Reported Will Be Supplied on Application

Abrasives			
Marble flour	ton	$20.00	
Pumicestone, pwd.	lb.	.02½	/$0.04
Rottenstone, domestic	ton	23.50	/28.00
Rottenstone, English	lb.		
Silica, spot, l. c. l.	lb.	.01¼	/ .03
Accelerators, Inorganic			
Lime, hydrated	ton	20.00	
Litharge, com., pwd., casks	lb.	.05¾	
Magnesia, calcined, heavy	lb.	.06	
carbonate	lb.	.05¾	/ .06
Accelerators, Organic			
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.		
Barak	lb.		
BLE	lb.		
Butene	lb.		
Captax	lb.		
Crylene	lb.		
paste	lb.		
DBA	lb.		
Di-esterex N.	lb.		
DOTG	lb.	.42	/ .44½
DPG	lb.	.30	/ .32½
Ethylidine aniline	lb.	.45	/ .47½
Formaldehyde aniline	lb.	.37½	/ .40
Grasselerator 808	lb.		
833	lb.		
Heptene	lb.		
base	lb.		
Hexamethylenetetramine	lb.	.46	/ .47
Hydrone	lb.		
Lead oleate, No. 999	lb.	.11½	
Witco	lb.	.10	
Lithex	lb.		
Methylene dianiline	lb.		
Monex	lb.		
Novex	lb.		
Phenex	lb.	.50	/ .55
Plastone	lb.		
R & H 40	lb.		
50	lb.		
50-D	lb.		
397	lb.		
Retardex	lb.	.35	/ .40
Safex	lb.		
SPDX	lb.	.70	/ .75
Super-sulphur No. 1	lb.		
No. 2	lb.		
Tensilac 39	lb.	.40	/ .42½
Thermlo F	lb.		
Thiocarbanilid	lb.	.25	/ .27
Thionex	lb.		
TMTT	lb.		
Trimene	lb.		
base	lb.		
Triphenyl guanidine	lb.	.58	/ .60
Tuads	lb.		
Ulto	lb.	3.00	
Vulcanex	lb.		
ZBX	lb.		
Zimate	lb.		
Acids			
Acetic 28% (bbls.)	100 lbs.	2.65	/ 2.90
glacial (carboys)	100 lbs.	9.64	/ 9.89
Sulphuric, 66°	ton	15.50	
Age Resisters			
Age-Rite Gel	lb.		
powder	lb.		
resin	lb.		
white	lb.		

Albasan	lb.		
Antox	lb.		
Stabilite	lb.	$0.54	/$0.56
Alba	lb.	.70	/ .75
VGB	lb.		
Zalba	lb.		
Antisun Materials			
Heliozone	lb.		
Sunproof	lb.		
Binders, Fibrous			
Cotton flock, dark	lb.	.08½	/ .10
dyed	lb.	.50	/ .85
white	lb.	.11	/ .16
Rayon flock, white	lb.	1.40	
colored	lb.	1.75	
Colors			
BLACK			
Bone, powdered	lb.	.05½	/ .15
Carbon (see Reenforcers)			
Drop (bbls.)	lb.	.05½	/ .17
Lampblack (commercial)	lb.	.07	/ .08
BLUE			
Blue toners	lb.	1.40	/ 3.50
Brilliant	lb.	3.50	
Prussian	lb.	.35	/ .37
Ultramarine	lb.	.06	/ .30
BROWN			
Iron oxide	lb.		
Mapico	lb.	.14¼	
Sienna, Italian, raw, pwd.	lb.	.04½	/ .11
GREEN			
Brilliant	lb.	3.50	
Chrome, light	lb.	.23	/ .25½
medium	lb.	.26	/ .27½
Chrome oxide	lb.	.23	/ .26
Dark	lb.	1.30	
Green toners	lb.	1.00	/ 2.00
Light	lb.	.70	
ORANGE			
Cadmium sulphide	lb.	.65	/ .75
Orange lake	lb.	.50	
Orange toners	lb.	.40	/ 1.60
ORCHID			
Orchid toners	lb.	1.50	/ 2.00
PINK			
Pink toners	lb.	1.50	/ 4.00
PURPLE			
Permanent	lb.	1.80	
Purple toners	lb.	.60	/ 2.00
RED			
Antimony			
Crimson, R. M. P. No. 3	lb.	.48	
Sulphur free	lb.	.52	
7-A	lb.	.35	
Z-2	lb.	.20	
Cadmium	lb.	.70	
Chinese	lb.	.85	
Crimson	lb.	.85	
Iron Oxides			
FER-OX brand, f.o.b. New Castle, Pa.	lb.	.08¼	
Rub-er-red	lb.	.08¼	
Softex	lb.	.08¼	
Mapico	lb.	.08¼	
Medium	lb.	.85	
Oxide, Spanish	lb.	.02	/ .03¼
Red toners	lb.	.80	/ .90
Scarlet	lb.	1.50	

WHITE			
Lithopone, c. l.	lb.	$0.04½	/$0.04¾
Albalith, l. c. l.	lb.	.04½	/ .04¾
Cryptone No. 19, l. c. l.	lb.	.06½	/ .06¾
Grasselli (50 lb. bags)	lb.	.04½	/ .04¾
(400 lb. bbls.)	lb.	.04¾	/ .05
Titanium oxide, pure	lb.	.20	
Titanox "B," l. c. l.	lb.	.06¾	/ .07
"C," l. c. l.	lb.	.06¾	/ .07
Zinc Oxide			
Black label (lead free) c. l., bags	lb.	.05¾	
Green label (lead free) c. l., bags	lb.	.05¾	
Green seal, l. c. l.	lb.	.09⅝	/ .09⅞
Green seal, Anaconda	lb.	.09⅝	/ .09⅞
Kadox, black label, l. c. l.	lb.	.09⅝	/ .09⅞
blue label, l. c. l.	lb.	.08⅝	/ .08⅞
red label, l. c. l.	lb.	.07¼	/ .07½
Red label (lead free) c. l., bags	lb.	.05¾	
Red seal, l. c. l.	lb.	.08⅝	/ .08⅞
Red seal, Anaconda	lb.	.08⅝	/ .08⅞
Special, l. c. l.	lb.	.05¾	/ .06
White seal (bbls.), l. c. l.	lb.	.10⅞	
White seal, Anaconda	lb.	.10⅞	
XX green, l. c. l.	lb.	.05¾	/ .06
XX red, l. c. l.	lb.	.05¾	/ .06
Zinc sulphide, l. c. l. (bbls.)	lb.	.13	
YELLOW			
Cadmium sulphide	lb.	.65	/ .75
Chrome	lb.	.16	
Lemon	lb.	1.50	
Mapico	lb.	.11	
Ochre, domestic	lb.	.01⅝	/ .02⅝
Yellow toners	lb.	2.50	
Deodorant			
Rodo	lb.		
Factice—See Rubber Substitutes			
Fillers, Inert			
Asbestine	ton		
Barytes, white, spot	ton	33.00	
off color, spot	ton		
Foam "A" (f.o.b. St. Louis)	ton	23.00	
Blanc fixe, dry, precip., c. l.	ton	70.00	/75.00
pulp	ton	42.50	/45.00
Infusorial earth	ton	40.00	/80.00
Kalite No. 1	ton	30.00	/60.00
No. 3	ton	40.00	/70.00
Suprex white, extra light	ton	60.00	/80.00
heavy	ton	45.00	/55.00
Whiting			
Chalk, imported	100 lbs.	1.00	/ 1.50
Domestic	100 lbs.	1.00	
Paris white, English cliffstone	100 lbs.	1.50	
Quaker	ton		
Sussex	ton		
Witco (l. c. l.) (f.o.b. New York)	ton	20.00	
Fillers for Pliability			
Flex	lb.		
Fumonex	lb.	.02½	/ .06
P-33	lb.		
Thermax	lb.		
Velvetex	lb.	.02	/ .05
Finishes			
Mica, amber	lb.	.04	

Starch, corn, pwd ......100 *lbs.* $2.44 /$2.64
potato ....*lb.* .06½
Talc, dusting ....*ton* 10.00 /70.00
Italian ....*lb.* .02½/ .03
Pyrax A ....*ton*

Inflating Material

Sponge paste ....*lb.* .30

Mineral Rubber

Genasco (fact'y) ....*ton* 40.00 /42.00
Gilsonite (fact'y) ....*ton* 37.26 /39.65
Granulated M. R. ....*ton*
Hydrocarbon, hard ....*ton*
Parmr Grade 1 ....*ton* 23.00 /28.00
Grade 2 ....*ton* 23.00 /28.00

Mold Lubricants

Sericite ....*lb.*
Soapbark (cut) ....*lb.* .07 / .07½
Soapstone ....*ton* 10.00/30.00

Oils

Castor, blown ....*lb.* .13
Poppy seed oil ....*gal.* 1.60
Red oil, distilled ....*lb.* .06⅝/ .07⅛

Protective Colloids

Bentonite (dispersion clay).*lb.* .02 / .02¼
Casein, domestic ....*lb.* .06½

Reenforcers

Aluminum flake (sacks,
c. l.) ....*ton* 21.85
(sacks, l.c.l.) ....*ton* 24.50
Carbon Black
Aerfloted arrow black ...*lb* .03 / .07
Century (works, c. l.) ..*lb.* .03
Certified, Cabot, c. l.,
f. o. b. works, bags...*lb.* .03
c. l., f. o. b. works,
cases ....*lb.* .04½
l. c. l., f. o. b. works. *lb.* .05½/ .07
Disperso (works, c. l.) *lb.* .03
Dixie brand .... *lb.* .03 / .07
Elastex ....*lb.* .03½/ .08
Gastex (f. o. b. fact'y).. *lb.* .02½/ .06
Kosmos brand .... *lb.* .03 / .07
Micronex .... *lb.* .03 / .05
Ordinary (compressed or
uncompressed) .... *lb.* .03 / .07
Clays
Bento ....*lb.*
Blue Ridge, dark ...... *ton*
Dixie .... *ton*
Dusto ....*lb.*
Langford .... *ton*
Lexo (works) .... *ton*
Par ....*ton*
Perfection .... *ton* 8.00 /20.00
Standard ....*ton* 7.50 /14.50
Suprex No. 1.......... *ton* 8.00
No. 2, dark .... *ton* 6.50
Glue, high grade...........*lb.* .20 / .25

Rubber Substitutes or Factice

Amberex ....*lb.* .15
Black ....*lb.* .06 / .08
Brown ....*lb.* .07 / .11
White ....*lb.* .08 / .12½

Softeners

Burgundy pitch ....*lb.* .06
Degras ....*lb.* .03 / .04
Fluxol ....*ton* 18.00 /80.00
Palm oil (Witco) ....*lb.* .07½
Para-flux ....*gal.* .15
Petrolatum, snow white ...*lb.* .06⅝/ .06¾
Rosin oil, compounded ....*gal.* .35
Rubberseed, drums ....*lb.* .07¾
Rubtack ....*lb.* .10
Tonox ....*lb.*
Witco Flux ....*gal.* .13

Solvents

Benzol (90% drums) ....*gal.* .25
Carbon bisulphide (drums)..*lb.* .05½/ .12
tetrachloride ....*lb.* .06½/ .07
Dip-Sol ....*gal.*
Dryolene, No. 9 ....*gal.*
Petrobenzol ....*gal.*
Rub-Sol ....*gal.*
Solvent naphtha (tanks)..*gal.* .26
Stod-Sol ....*gal.*
Troluoil ....*gal.*
Turpentine, dest. distilled *gal.* .37 / .38

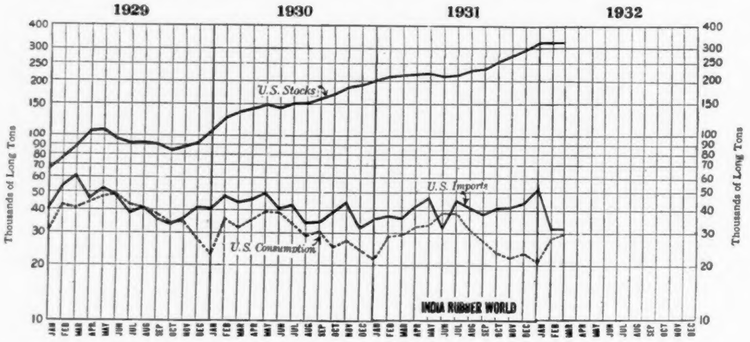
Stabilizers

Laurex, ton lots ....*lb.*
Stearates
Aluminum ....*lb.*
Calcium ....*lb.*
Magnesium ....*lb.* .25
Zinc ....*lb.* .25
Stearex B ....*lb.* .06½/ .10
Stearex flake ....*lb.* .06½/ .10
Stearic acid, dbl. pres'd...*lb.* .08 / .12

Vulcanizing Ingredients

Sulphur
Chloride, drums ....*lb.* .03½/ .04
Telloy ....*lb.*
Vandex ....*lb.*
(See also Colors—Antimony)

Imports, Consumption, and Stocks



United States Stocks, Imports, and Consumption

CONSUMPTION of crude rubber by manufacturers in the United States for February amounted to 30,012 long tons as compared with 27,962 long tons for January, 1932, and represents an increase of 7.3% which is contrary to the usual seasonal decline of 3.5%, according to statistics issued by The Rubber Manufacturers Association. Consumption for February a year ago was 28,797 long tons.

This organization reports imports of crude rubber for February to be 30,546 long tons, a decrease of 2.4% under the January figure and 16.6% below February a year ago.

The total domestic stocks of crude rubber on hand February 29 are estimated at 322,117 long tons, which compares with January 31 stocks of 322,860. While February stocks show little change as compared with January, they were 51.3% above stocks the same date last year.

The participants in the compilation report 51,728 long tons of crude rubber afloat for the United States ports on February 29, which compares with a revised figure of 42,234 long tons afloat on January 31, 1932.

London and Liverpool Stocks

Week Ended	Tons: London	Tons: Liverpool
Feb. 27	65,923	59,868
Mar. 5	65,459	60,288
Mar. 12	65,121	60,776
Mar. 19	65,014	60,922
Mar. 26	64,461	60,775

United States Crude and Waste Rubber Imports for 1932 by Months

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Manicobas and Matto Grosso	Totals 1932	Totals 1931	Balata	Miscellaneous	Waste
Jan. ...*tons*	30,847	271	142	38	..	..	..	31,298	37,098	53	731	50
Feb.	30,041	361	144	..	..	..	..	30,546	36,645	98	689	..
Total, 2 mos., 1932 *tons*	60,888	632	286	38	..	..	..	61,844	.....	151	1,420	50
Total, 2 mos., 1931..*tons*	72,274	545	847	76	1	..	..	.....	73,743	66	1,540	38

Compiled from The Rubber Manufacturers Association, Inc., statistics.

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Net Imports* Tons	U. S. Consumption Tons	U. S. Stocks on Hand† Tons	U. S. Stocks Afloat† Tons	United Kingdom Stocks†‡ Tons	Singapore and Penang Stocks, Etc.†‡ Tons	World Production (Net Exports)‡ Tons	World Consumption Estimated‡ Tons	World Stocks†‡§ Tons
1926	411,962	358,415	72,510	51,238	50,074	26,443	614,778	533,915	149,026
1927	431,807	372,528	100,130	47,938	65,663	25,798	605,196	589,128	193,146
1928	446,421	442,227	66,166	68,764	22,691	32,905	649,674	667,027	122,828
1929	561,454	466,475	105,138	62,389	73,276	36,768	863,410	785,475	228,572
1930	488,343	375,980	200,998	56,035	118,297	45,179	821,815	684,993	366,034
1931	495,163	348,986	322,826	53,940	127,103	55,458	797,441	668,660	505,386
1932									
January ...	31,298	27,962	322,860	42,234	125,276	59,836	63,627	50,480	507,962
February ..	30,546	30,012	322,117	51,728	......	......	......	......	......

*Including liquid latex, but not guayule. †Stocks on hand the last of the month or year. ‡W. H. Rickinson & Son's figures. §Stocks at the 3 main centers, U. S. A., U. K., Singapore and Penang.

Cotton and Fabrics

IN THE first half of the month cotton gave a good account of itself, but the trend was reversed when it was rumored that the Farm Board would dispose of its holdings in foreign markets. Although this rumor was quickly and emphatically denied, the damage was done, and prices were considerably lower at the end of the month than at the start.

The heavy exports this year are one of the most cheerful factors in the market. With exports over a million bales of the 1931 season already, the spread will probably increase before the season is over. Most of the gain, of course, is due to the heavy shipments to the Orient; and as the fighting ceases in China and the cotton mills reopen, the takings may gain.

Domestic consumption is satisfactory considering conditions. The notable attempt by spinners to curtail production to demand, both by agreement and by elimination of night work, is commendable.

The market has no definite tendencies at present. The new crop is about to be planted, and for the next few months weather conditions, fertilizer sales, and the extent of weevil emergence will take first place in the news.

The mild winter leads some traders to believe that the weevil pest will be present in large numbers although the recent cold spell killed off a great quantity of them. Fertilizer sales are low this year, but they were low last year, and a record yield was produced. Reduction of acreage does not promise to assume large proportions, but whether the cotton will be adequately planted and tended is another question. Bankers are not anxious to loan large sums; besides the low price of cotton precludes that possibility anyway.

What the future course of the market will be depends on how the new crop develops—the smaller the crop, the better.

COTTON BEAR POINTS

1. **The Lancashire dispute about more looms to a weaver threatens production.**
2. **Final figures for the 1931 crop were 17,060,772 equivalent 500-pound bales, against 13,931,597 in 1930 and 14,824,861 in 1929.**
3. **The large supply of cotton held by the Farm Board will be an uncertain factor in the market until sold.**
4. **The Texas Cotton Acreage Reduction Law was declared unconstitutional by the Court of Appeals.**
5. **Indications are for only a small acreage reduction in the new crop.**
6. **Demand for cotton goods declined somewhat in March.**
7. **Fear exists of increased spot offerings by southern farmers as money is needed to plant the new crop.**

COTTON BULL POINTS

1. **Cotton cloth output was higher in February than in January, 1932, and in February, 1931.**
2. **Exports this season are 6,673,303 bales against 5,541,501 last season.**
3. **Warm winter weather probably will cause a large weevil emergence.**
4. **World consumption of cotton in the first half of the season was 6,150,000 bales against 5,736,000 in the second half of last season and 5,377,000 in the first half.**
5. **Domestic consumption in February was 459,018 bales of lint compared with 435,337 in January and 433,376 in February, 1931.**
6. **The cotton spinning industry operated at 92.5% capacity in February against 84.5% in January and 87.2% in February, 1931.**
7. **American cotton is replacing Indian cotton with foreign cotton spinners.**
8. **World takings of cotton are almost 2,000,000 bales ahead of 1931.**

Week ended February 27. The active demand which had prompted the rise in the previous week was absent this week, and prices just about held their own. Foreign buying was not in evidence to the extent of previous weeks, and considerable liquidation occurred in the March contract prior to notice day. The South was a heavy seller, and on only one day, Thursday, was there any trade buying to offset these sales.

For the week, prices were unchanged to 7 points lower. The March contract sold at 6.92¢ unchanged; May was 7.07 against 7.12 the previous week; July, 7.23 against 7.28; October, 7.43 against 7.48; December, 7.60 against 7.67; and January, 7.66 against 7.73.

The Liverpool market was steady and would have benefited our market more if domestic news had been better. Statistics from Liverpool put British stocks at 838,000 bales against 1,098,000 a year ago. Of this amount, 407,000 bales is American cotton, against 582,000 bales a year ago.

The most encouraging item in the market's news was the continued high rate of exports and the increased use of American cotton in preference to foreign.

The weekly figures of the Cotton Exchange showed that forwardings to mills were 235,000 bales against 152,000 in the same week last year. For the season forwardings are now 8,424,000 bales against 6,814,000 bales last year and 8,792,000 two years ago.

Exports for the week were 183,000 bales against 89,000 last year. For the season, exports are 5,751,000 bales against 4,888,000 last year and 5,331,000 two seasons ago. It was also revealed that exports of American cotton to Japan, China, and India were 2,586,989 bales, compared with 1,011,930 in the same time last year, while Indian cotton exported to these countries was 559,000 bales less than in last year.

Cotton cloth production advanced sharply last week, reaching the highest level since May 3, 1930. The reason is that the curtailment plan goes into effect next week, and the buying movement in the last few weeks was of larger proportions than was realized. Sales have about equaled production for the last 2 weeks, according to the N. Y. Cotton Exchange Service, and, "Cloth buyers generally are operating cautiously, and there is no indication at the moment of any early pronounced change in the mill situation."

New York Quotations

March 26, 1932

Drills

		Cents
38-inch 2.00-yd.	yd.	$0.09
40-inch 3.47-yd.		.05 1/16
50-inch 1.52-yd.		.12½
52-inch 1.90-yd.		.10
52-inch 2.20-yd.		.08⅝
52-inch 1.85-yd.		.10¼

Ducks

38-inch 2.00-yd. D. F	yd.	.09
40-inch 1.45-yd. S. F		.13
72-inch 1.05-yd. D. F		.20
72-inch 16.66-oz.		.21
72-inch 17.21-oz.		.22
MECHANICAL		
Hose and belting	lb.	.19
TENNIS		
52-inch 1.35-yd.	yd.	.14

Hollands

RED SEAL		
36-in.	yd.	.11½
40-in.		.12
50-in.		.17½
GOLD SEAL		
40-in., No. 72	yd.	.14½

Tire Fabrics

		Cents
BUILDER		
17¼ oz. 60" 23/11 ply Karded peeler	lb.	$0.23
17¼ oz. 60" 10/5 ply Karded peeler	lb.	.21
CHAFER		
14 oz. 60" 20/8 ply Karded peeler	lb.	.23
12 oz. 60" 10/4 ply Karded peeler	lb.	.19
9¼ oz. 60" 20/4 ply Karded peeler	lb.	.25
9¼ oz. 60" 10/2 ply Karded peeler	lb.	.21
CORD FABRICS		
23/3/3 Karded peeler, 1 1/16" cotton	lb.	.23
23/4/3 Karded peeler, 1 1/16" cotton	lb.	.25
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.21
13/3/3 Karded peeler, 1 1/16" cotton	lb.	.20
7/2/2 Karded peeler, 1 1/16" cotton	lb.	.20
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.25
23/5/3 Karded Egyptian, Egyptian upper cotton	lb.	.36
23/5/3 Combed Egyptian	lb.	.41
LENO BREAKER		
8¼ oz. and 10¼ oz. 60" Karded peeler	lb.	.23

Osnaburgs

		Cents
40-in. 2.35-yd.	yd.	$0.07⅞
40-in. 2.48-yd.		.07½
40-in. 3.00-yd.		.06 3/16
40-in. 10-oz. part waste		.08¾
40-in. 7-oz.		.06⅛
37-in. 2.42-yd.		.07⅝

Raincoat Fabrics

COTTON		
Bombazine 64 x 60	yd.	.08¾
Bombazine 60 x 48		.07¾
Plaids 60 x 48		.09¼
Plaids 48 x 48		.08¼
Surface prints 64 x 60		.10½
Surface prints 60 x 48		.09½
Print cloth, 38½-in., 64 x 60		.04
Print cloth, 38½-in., 60 x 48		.03½
SHEETINGS, 40-INCH		
48 x 48, 2.50-yd	yd.	.05⅝
48 x 48, 2.85-yd		.05½
64 x 68, 3.15-yd		.05⅜
56 x 60, 3.60-yd		.04¾
44 x 48, 3.75-yd		.04¼
44 x 40, 4.25-yd		.03⅝
SHEETINGS, 36-INCH		
48 x 48, 5.00-yd	yd.	.03⅜
44 x 40, 6.15-yd		.03

Week ended March 5. The favorable factors in the market for the week emanated from England. Announcement was made that $150,000,000 owed to New York banks was to be repaid by the British Government. Borrowed last fall, this settlement is several months prior to the due date. Restrictions were to be raised from dealings in foreign exchange, and a drop in the discount rate was expected. This drop did not materialize, however, and the market sold off slightly when the Bank of England failed to make the looked-for announcement.

The week's prices showed a change of only 2 to 6 points on the up side. More and more attention is being focused on the new crop prospects, and forecasts as to probable acreage are already coming in.

The March contract closed at 6.98¢ compared with a final price of 6.92¢ the previous week. May was 7.09 against 7.07; July, 7.25 against 7.23; October, 7.44 against 7.43; December, 7.65 against 7.60; and January, 7.73 compared with 7.66.

On March 5 the Tenth Court of Civil Appeals sustained the ruling of District Judge W. C. Davis at Franklin, Tex., holding that the Texas Cotton Acreage Reduction Law is "unconstitutional, null, and void." Since this decision eliminates legal action as a restriction factor, it seems to be up to Mr. Boll Weevil to effect a cut in output. From all reports there will be a large survival of the pest as weather has been mild most of the winter, and a reading of 10 is necessary to kill off the weevil.

Cotton cloth production declined slightly last week, and next week the curtailment plan will be operative.

Exports continue heavy to the Orient, being 102,000 for the week, against 66,000 in the same week last year. Japanese spinning mills consumed 216,000 bales of cotton in January against 188,000 in January last year. The New York Cotton Exchange says that the Japanese spinners are using about half American cotton, against 40% American and 60% foreign last year.

Week ended March 12. Despite wide fluctuations in foreign markets the prices on the local exchange held steady, with net change of from 9 to 17 points on the down side for the entire week.

When sterling exchange advanced sensationally in the first half of the week, straddling operations eased quotations here somewhat, but on no day were the changes greater than a few points. Arbitrage interests bought heavily here, selling in Liverpool. When sterling exchange eased off, Liverpool prices began to come more in line with American prices, and by Friday had gained 40 points in 3 days, against a break of a week which had carried Liverpool prices down 60 points.

At the close on Saturday the March contract sold at 6.88¢ against the previous week's closing quotation of 6.98; May was 6.98 against 7.09; July, 7.15 against 7.25; October, 7.35 against 7.44; December, 7.53 against 7.65; and January, 7.60 against 7.73.

The expected increase in American cotton consumption in recent months was verified by the report of the International Federation of Master Cotton Spinners & Manufacturers' Associations. World consumption of American cotton was 5,940,000 bales to January 31, 1932, a gain of 622,000 bales.

WEEKLY AVERAGE PRICES OF MIDDLING COTTON

Week Ended	Cents per Pound
Feb. 27	7.05
Mar. 5	7.10
Mar. 12	7.06
Mar. 19	6.93
Mar. 26	6.68

Domestic consumption for February is put at 447,000 bales by the Cotton Exchange Service, against 434,000 last year. Exports of yarns from England, according to the British Board of Trade, were 13,000,000 pounds in February against 9,000,000 last year, the most favorable monthly figure in several years. Exports of cloths were 180,000,000 yards in February against 146,000,000 in February, 1931.

Production of cotton cloth for the week ended March 5 shows a further decline from the preceding week. The curtailment plan agreed to by a number of spinners did not have so great an effect on production as it might have because this is normally the season when there is a natural curtailment. Sales, according to the New York Cotton Exchange Service, did not equal production and the unfavorable reports as to the distribution at retail has held up cotton in the primary markets.

Week ended March 19. Cotton prices yielded largely to outside influences during the week until Friday, when it was rumored that the Reconstruction Board was going to sell cotton of the Federal Farm Board in European markets on credit. Prices sold off from 16 to 20 points on the report, carrying the July contract to 6.90¢. The Kreuger affair sent prices on the stock exchange off, and in sympathy with this decline the cotton market sold off from 10 to 12 points. The worry over the action of the Reconstruction Board subsided quickly when an announcement was made that the Stabilization Corp. had "adopted" no plan to sell its cotton and is under agreement to sell none prior to August, 1932.

Price changes for the entire week amounted to from 19 to 27 points downward, a new low for the movement. March closed at 6.69 against 6.88 the previous week. May was 6.72 against 6.98; July, 6.90 against 7.15; October, 7.12 against 7.35; December, 7.30 against 7.53; and January, 7.38 against 7.60.

The Census Bureau announced that February consumption was 450,018 bales of lint and 52,764 of linters, compared with 435,337 of lint and 50,241 of linters in January, 1932, and 433,376 of lint and 53,687 of linters in February, 1931.

The monthly report of the Association of Cotton Textile Merchants of New York revealed that stocks of carded cotton cloths on hand reached the lowest point ever recorded since statistics were first compiled in January, 1928. Stocks on hand at the end of February were 239,654,000 yards, a drop of 5.7% from the total at the end of January.

Production during February was 244,342,000 yards, against sales of 245,582,000; shipments were 258,744,000 yards; and unfilled orders were 377,988,000 yards, compared with 395,802,000 at the end of February, 1931.

Week ended March 24. In the short preholiday sessions of this week the market sold off about ¼-¢ compared with the close of last week. A good part of the decline was induced by rumors that the holdings of the Farm Board would be sold in foreign markets. Although these rumors were later denied, they unsettled the market, and it was not until the last trading day before the holiday that trading was again normal.

On Monday the government's final report of the 1931 crop, about as was expected, served to emphasize the accuracy of the figures of the Department of Agriculture. The final estimate was 17,060,772 bales of 500-pound size, compared with the December estimate of 16,918,000 bales, or only about 143,000 bales difference.

Cotton cloth output in February was 539,791,000 square yards, against 510,815,000 in January, and 520,242,000 in February, 1931. For the full year 1931 the estimated output was 6,387,605,000 square yards, against 6,303,657,000 in 1930.

The New York Cotton Exchange Service revealed that consumption of Egyptian cotton increased materially last year. During the first half of the present season the world used 510,000 running bales, compared with 465,000 in the second half of the preceding season. Consumption in the first half of this year increased more than 25% over that of the same period a year ago.

May closed at 6.50 on Thursday, compared with 6.72 the week before. July was 6.66 against 6.90; October, 6.87 against 7.12; December, 7.02 against 7.30; and January, 7.12 against 7.38.

On March 28 the market was quiet. The New York price on spot middlings grade closed at 6.30¢, a decline of 30 points from the previous close.

Cotton Fabrics

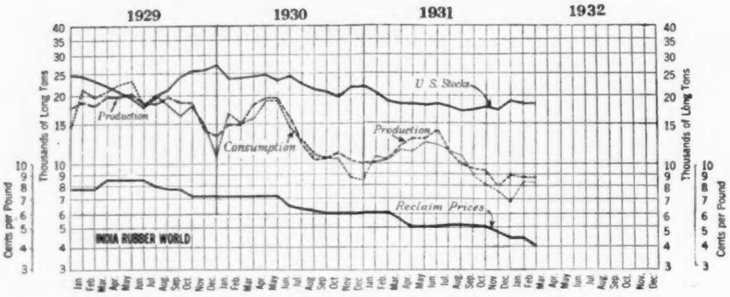
DUCKS, DRILLS, and OSNABURGS. The situation of the cotton textile market shows no observable change beyond a little firmer position in the matter of price on the part of sellers. The demand continues steady but not in sufficient volume to occasion a sharp advance in price.

RAINCOAT FABRICS. Manufacturers are still sampling preliminary to spring revival of consuming demand.

SHEETINGS. During the past month the market was very inactive; however prices were firmly held. This condition was attributed to a noticeable falling off of finished goods business; hesitancy on the part of consumers to wait until the manufacturers' sales tax reaches intelligent form; and to the recent cold weather. In the industrial field considerable interest is awaiting production of the new Ford car. Inventories are still remarkably low, but spring buying is due very soon.

TIRE FABRICS. February tire fabric consumption declined slightly compared with that in January. Prices are nominal, and very little buying is in progress.

Reclaimed Rubber



Production, Consumption, Stocks, and Price of Tire Reclaim

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption Per Cent to Crude	United States Stocks*	Exports
1925	132,930	137,105	35.6	13,203	4,571
1926	180,582	164,500	45.9	23,218	5,391
1927	189,144	178,471	47.6	24,980	8,540
1928	208,516	223,000	50.4	24,785	9,577
1929	219,057	224,253	47.9	27,464	12,721
1930	157,967	153,497	41.5	24,008	9,468
1931	132,462	125,001	35.7	19,257	6,971
1932					
January	8,753	8,440	30.2	18,712	475
February	8,731	8,332	27.6	18,659	......

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

WHILE consumption of reclaimed rubber fell to 8,332 tons in February from the January total of 8,440 tons, takings of crude amounted to 30,012 tons, compared with 27,962 tons in January. The ratio of reclaimed used to crude was 27.6% in February against 30.2% in January.

The explanation is apparent. During February and March the price of crude rubber fell to the lowest prices in its history. The abandonment of all hope of restriction sent crude to 3¢ a pound, and traders look for even lower prices.

With such quotations, reclaim is naturally at a disadvantage. But in spite of this fact prices did not change in a single instance. Dealers state that reclaim is selling at such a low price that further declines are highly improbable.

The sharply curtailed activity in the automobile field is also responsible for the low rate of consumption. Even the large manufacturers, and the manufacturers of low priced cars have cut down their schedules. When Ford announced that he was presenting 2 new models, it was at first thought that his announcement would stimulate production all the way round. But the tactics that he used 4 years ago are again evident. Only rumors are forthcoming from his factory, and no one knows when his new models will appear, or whether work has even started on them.

As the price differentials between crude and reclaim widen in favor of the former, it is apparent that, lacking the price appeal, there is another reason for the continued use of reclaim. That reason is inherent in the qualities of reclaim. It has properties which crude lacks, and manufacturers are willing to pay a premium for those advantages.

Factories have curtailed production somewhat in the last month, in line with the reduced demand. Some concerns are running only a few days a week, others on a part-time basis. Insulated wire manufacturers report a quieter market, and the attitude of manufacturers generally seems to be a waiting one.

New York Quotations

March 26, 1932

	Spec. Grav.	Cents
High Tensile		
Super-reclaim, black	1.20	5¼/5½
red	1.20	5 /5¼
Auto Tire		
Black	1.21	4 /4¼
Black selected tires	1.18	4¼/4½
Dark gray	1.35	5 /5¼
White	1.40	5½/5¾
Shoe		
Unwashed	1.60	5 /5¼
Washed	1.50	6 /6¼
Tube		
No. 1	1.00	6½
No. 2	1.10	4¾/5
Truck Tire		
Truck tire, heavy gravity	1.55	5 /5¼
Truck tire, light gravity	1.40	5¼/5½
Miscellaneous		
Mechanical blends	1.60	3 /3½

Rubber Scrap

THE brighter sentiment evident during February suffered a reversal in March. The scrap market was extremely dull, with business at a standstill, and the already rock bottom prices being shaded here and there.

Consumption is limited, and this fact is naturally reflected in collections. For many months now, prices have been so low that making collections is hardly worthwhile.

BOOTS AND SHOES. The demand was fair during the month, although prices dropped fractionally. Untrimmed arctics were quoted at 50¢ against 62½ to 75 last month. The mild winter, with little weather where it was necessary to wear boots and rubbers, makes collections scarce.

INNER TUBES. The conditions that have prevailed in this classification for several months still hold. For many of the varieties there is a good demand, especially for export, but it is so hard to make collections that the demand remains largely unsatisfied. No. 1 floating tubes are especially scarce. Red tubes are in very good demand for export, and gray tubes are in fairly good demand. No. 1 floating tubes were quoted at 3¼ to 3½¢ against 3½ to 3¾ last month. No. 2 compounds were unchanged, as were reds. But mixed tubes sold off ¼-¢.

TIRES. Sales turned soft during March. Demand was almost absent, and collections were but fair. While prices were maintained last month, they were down this month. Black auto peelings were half a dollar down, and light gravity solids were quoted at $29 to $31 against $30 to $31.

MECHANICALS. In a quiet market mechanicals sold off. After holding their own for 3 months, several grades were lower. Air brake hose was half a dollar down; No. 1 reds were ⅛-¢ lower; No. 2 reds were unchanged; white druggists' sundries and mechanicals were ¼-¢ off.

HARD RUBBER. Prices slid from 8¼ to 8⅝ to 7½ to 7¾. Demand was fairly good.

CONSUMERS' BUYING PRICES

Carload Lots

Delivered Eastern Mills
March 26, 1932

		Prices
Boots and Shoes		
Boots and shoes, black	100 *lb.*	$0.75/$1.00
Colored	100 *lb.*	.625 /.75
Untrimmed arctics	100 *lb.*	.50
Inner Tubes		
No. 1, floating	*lb.*	.03¼/.03½
No. 2, compound	*lb.*	.01½/.01⅝
Red	*lb.*	.01⅝/.01¾
Mixed tubes	*lb.*	.01¼/.01.30
Tires		
Pneumatic Standard		
Mixed auto tires with beads	*ton*	8.00/ 8.25
Beadless	*ton*	12.00/12.50
Auto tire carcass	*ton*	12.00/12.50
Black auto peelings	*ton*	19.00/19.50
Solid		
Clean mixed truck	*ton*	24.00/26.00
Light gravity	*ton*	29.00/31.00
Mechanicals		
Mixed black scrap	*lb.*	.00⅝/.00¾
Hose, air brake	*ton*	7.50/ 8.00
Garden, rubber covered	*lb.*	.00⅜/.00½
Steam and water, soft	*lb.*	.00⅜/.00½
No. 1 red	*lb.*	.01⅛/.01¼
No. 2 red	*lb.*	.01 /.01⅛
White druggists' sundries	*lb.*	.01¼/.01½
Mechanical	*lb.*	.00¾/.00⅞
Hard Rubber		
No. 1 hard rubber	*lb.*	.07½/.07¾

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	December, 1931		Nine Months Ended December, 1931	
UNMANUFACTURED	Pounds	Value	Pounds	Value
Rubber, gutta percha, etc	5,493,375	$388,135	41,690,731	$2,832,360
Rubber, recovered	660,100	31,313	6,401,500	298,330
Rubber and gutta percha scrap	131,800	4,545	1,694,300	34,001
Balata	200	467	7,099	5,561
Rubber substitute	8,300	956	237,900	29,582
Totals	6,293,775	$425,416	50,031,530	$3,199,834
PARTLY MANUFACTURED				
Hard rubber sheets and rods	383	$270	12,292	$8,105
Hard rubber tubes	....	301	....	4,379
Rubber thread not covered	26,391	20,058	188,286	154,438
Totals	26,774	$20,629	200,578	$166,922
MANUFACTURED				
Belting	....	$3,710	....	$62,324
Hose	....	3,156	....	48,059
Packing	....	3,588	....	36,835
Boots and shoes ... *pairs*	134	217	41,683	15,275
Clothing, including waterproofed	....	3,268	....	45,798
Raincoats	405	1,399	16,453	47,318
Gaskets	....	....	....	....
Gloves	....	971	....	13,717
Hot water bottles	....	2,136	....	21,010
Tires, bicycle ... *number*	2,003	684	38,595	18,485
Pneumatic ... *number*	310	5,258	35,240	219,520
Inner tubes ... *number*	26	107	9,822	9,988
Solid for automobiles and motor trucks ... *number*	44	2,196	514	18,256
Other solid tires	....	701	....	19,822
Mats and matting	....	1,491	....	27,114
Cement	....	1,909	....	48,108
Golf balls ... *dozen*	190	638	34,475	104,842
Heels ... *pairs*	9,599	677	426,321	13,177
Other rubber manufactures	....	72,092	....	827,336
Totals	....	$104,198	....	$1,596,984
Totals, rubber imports	....	$550,243	....	$4,963,740

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED				
Waste rubber	$2,146	....	$35,327	....
MANUFACTURED				
Belting	$13,272	....	$204,477	....
Canvas shoes with rubber soles	67,094	....	1,312,747	....
Boots and shoes	78,379	....	1,829,627	....
Clothing, including waterproofed	1,807	....	33,101	....
Hose	4,024	....	83,698	....
Tires, bicycle	28	....	5,336	....
Pneumatic	210,431	....	3,927,629	....
Inner tubes	19,288	....	378,705	....
Solid	1,034	....	5,894	....
Other rubber manufactures	245,760	$18,377	1,601,844	$38,162
Totals	$641,117	$18,377	$9,383,058	$38,162
Totals, rubber exports	$643,263	$18,377	$9,418,385	$38,162

World Rubber Shipments—Net Exports

Long Tons

	Calendar Years		1931		1932	
	1930	1931	Nov.	Dec.	Jan.	Feb.
British Malaya						
Gross exports	547,043	519,740	48,012	35,741	44,538	42,008
Imports	133,876	125,506	9,529	11,314	10,304	8,008
Net	413,167	394,234	38,483	24,427	34,234	34,000
Ceylon	76,406	61,766	4,609	6,346	4,570	4,472
India and Burma	10,782	8,470	408	572	732	....
Sarawak	10,310	10,451	830	1,115	756	696
British No. Borneo	7,052	6,097	*500	*500	*500	*500
Siam	4,349	4,218	390	287	457	334
Java and Madura	69,755	75,952	7,351	5,942	5,155	....
Sumatra E. Coast	79,396	87,747	8,174	8,562	8,815	....
Other N. E. Indies	115,254	116,009	7,981	9,059	8,703	....
French Indo-China	9,877	11,713	731	1,567	1,000	1,096
Amazon Valley	14,260	12,121	872	836	831	352
Other America	516	222	5	....	....	....
Guayule	1,095	....	....	....	....	....
Africa	3,961	3,072	228	203	*200	*200
Totals	816,180	792,072	70,562	59,416	65,953	....

* Estimate.

Compiled by Rubber Division, Department of Commerce.

World Rubber Absorption—Net Imports

Long Tons

	Calendar Years		1931	1932	
CONSUMPTION	1930	1931	Dec.	Jan.	Feb.
United States	376,107	352,047	21,596	28,207	30,275
United Kingdom	74,760	76,583	7,422	5,065	....
NET IMPORTS					
Australia	5,354	7,649	787	....	....
Austria	2,365	2,970	263	....	....
Belgium	10,740	11,009	652	....	....
Canada	28,793	25,261	2,452	1,746	....
Czechoslovakia	4,532	7,717	932	....	....
Denmark	1,147	971	89	....	....
Finland	1,262	781	14	....	....
France	68,503	46,466	2,696	2,588	....
Germany	45,488	39,688	2,950	....	....
Italy	18,570	10,149	859	627	....
Japan	32,731	43,483	5,093	5,782	....
Netherlands	2,924	2,220	135	....	....
Norway	1,143	820	56	....	....
Russia	16,229	30,671	4,474	....	....
Spain	2,400	2,605	283	462	313
Sweden	4,414	3,788	518	....	....
Switzerland	808	848	49	....	....
Others estimated†	7,200	*9,600	*800	*800	*800
Totals	705,470	675,326	52,120	....	....
Minus United States (Cons.)	376,107	352,047	21,596	28,207	30,275
Total foreign	329,363	323,279	30,524	....	....

* Estimate to complete table.

Compiled by Rubber Division, Department of Commerce, Washington, D. C.

Tire Production Statistics

	Pneumatic Casings—All Types		
	Inventory	Production	Total Shipments
1929	9,470,368	54,980,672	55,515,884
1930	7,202,750	40,772,378	42,913,108
1931	6,219,776	38,992,220	40,048,552
1932 January	6,329,417	2,769,988	2,602,469

	Solid and Cushion Tires		
	Inventory	Production	Total Shipments
1929	122,200	407,347	436,027
1930	75,871	204,340	250,635
1931	38,815	136,261	167,555
1932 January	37,327	8,522	9,488

	Inner Tubes—All Types		
	Inventory	Production	Total Shipments
1929	10,245,365	55,062,886	56,473,303
1930	7,999,477	41,936,029	43,952,139
1931	6,337,570	38,666,376	40,017,175
1932 January	6,175,055	2,718,508	2,803,369

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%)
	Cotton Fabric Pounds	Crude Rubber Pounds	Gallons
1929	208,824,653	598,994,708	14,748,552,000
1930	158,812,462	476,755,707	16,200,894,000
1931	151,143,715	456,615,428	16,941,750,000
1932 January	12,156,282	36,850,171	1,112,370,000

Rubber Manufacturers Association figures representing 80% of the industry since January, 1929, with the exception of gasoline consumption.

CLASSIFIED ADVERTISEMENTS

SITUATIONS WANTED

CHEMIST, AGE FORTY-TWO, SINGLE, 14 YEARS' EXPERIENCE, laboratory and factory work on tires, insulation, and reclaiming. Wide variety of non-rubber chemical experience. Address Box No. 12,021, care of INDIA RUBBER WORLD.

YOUNG MAN, TWENTY-SEVEN, ASSISTANT SUPERINTENDENT or junior executive, six years' experience production, factory development and research with large corporations, tires, tubes, sundries, packings, brake linings. Knowledge compounding. Moderate salary. Fine record and references. Address Box No. 12,022, care of INDIA RUBBER WORLD.

MAN WITH MANY YEARS' EXPERIENCE IN DEVELOPMENT and production; capable; versatile; rubber chemistry and technology at Akron University; can manufacture oil- and acid-proof rubber substitute; age thirty-three; single; Mason. Address Box No. 12,027, care of INDIA RUBBER WORLD.

HARD RUBBER EXECUTIVE, HAVING THOROUGH KNOWLEDGE and experience, extending through compounding, purchasing, manufacturing, development of products, methods, and sales. Available. Address Box No. 12,028 care of INDIA RUBBER WORLD.

SITUATIONS WANTED—Continued

FACTORY MANAGER AND DEVELOPMENT MAN, EXPERIENCED in both soft and hard rubber mechanicals, calenders, mills, and presses. Knowledge of compounding. Reputed excellent handler of men. Address Box No. 12,030, care of INDIA RUBBER WORLD.

AVAILABLE IMMEDIATELY: THOROUGHLY TRAINED AND experienced rubber man in mechanicals, specialties, footwear, toys, and golf balls. Address Box No. 12,031, care of INDIA RUBBER WORLD.

CHEMIST, AGE THIRTY-SIX, MARRIED, UNIVERSITY graduate, desires permanent position. Good technical training, 11 years' experience in alkalis, acids, heavy chemicals, organic accelerators and analyses, rubber and rubber reclaiming manufacture. Available immediately. Moderate salary. Address Box No. 12,034, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

WANTED: A PRACTICAL MAN, THOROUGHLY EXPERIENCED in making all kinds of toy balloons. Must be able to supervise the layout of a factory on the most modern lines. Shortly to be established in London. Salary and percentage. Write fully. Address Box No. 12,024, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

ANY WELL EQUIPPED RUBBER COMPANY CAN MAKE GOLF balls at a fine profit. Let me give you further details from my thorough experience in this line. Address Box No. 12,032, care of INDIA RUBBER WORLD.

(Advertisements continued on page 101)

United States Statistics

Imports of Crude and Manufactured Rubber

	December, 1931		Twelve Months Ended December, 1931	
Unmanufactured—*Free*	Pounds	Value	Pounds	Value
Crude rubber	119,920,599	$5,610,129	1,113,588,566	$72,918,949
Liquid latex	630,726	41,771	10,414,712	884,355
Jelutong or pontianak	1,439,189	62,657	12,940,545	1,019,010
Balata	208,795	37,815	2,704,793	411,692
Gutta percha	1,541	1,945	274,624	35,949
Guayule	......	......	......	......
Siak, scrap, and reclaimed	906,782	30,670	9,514,383	118,617
Totals	123,107,632	$5,784,987	1,149,437,623	$75,388,572
Chicle, crude ... *Free*	1,023,616	$484,427	8,930,544	$4,195,407
Manufactured—*Dutiable*				
Tires ... *number*	7,084	$9,670	38,312	$87,669
Other rubber manufactures	......	52,366	......	897,458
Totals	......	$62,036	......	$985,127

Exports of Foreign Merchandise

Rubber and Manufactures				
Crude rubber	5,586,804	$331,529	57,331,734	$4,255,572
Balata	12,813	1,044	115,375	27,437
Guayule	......	......	31,400	4,398
Gutta percha, rubber substitutes, and scrap	1,032	154	13,685	2,287
Rubber manufactures	......	1,171	......	26,730
Totals	......	$333,898	......	$4,316,424

Exports of Domestic Merchandise

Rubber and Manufactures				
Reclaimed	1,034,200	$44,224	15,625,576	$724,241
Scrap and old	5,310,649	96,146	53,258,084	1,132,105
Rubberized automobile cloth ... *sq. yd.*	46,672	20,113	907,907	393,694
Other rubberized piece goods and hospital sheeting ... *sq. yd.*	49,499	16,774	1,228,732	480,414
Footwear				
Boots ... *pairs*	53,854	94,973	719,581	1,546,575
Shoes ... *pairs*	42,565	28,600	874,910	717,024
Canvas shoes with rubber soles ... *pairs*	49,757	28,912	1,414,494	888,155
Soles ... *doz. pairs*	5,719	11,925	88,922	224,759
Heels ... *doz. pairs*	56,314	31,764	767,068	488,814
Water bottles and fountain syringes ... *number*	16,667	7,560	394,194	182,003
Gloves ... *doz. pairs*	7,969	18,385	90,278	221,310
Other druggists' sundries	......	24,470	......	331,682
Balloons ... *gross*	46,482	35,124	657,234	594,016
Toys and balls	......	2,984	......	108,846
Bathing caps ... *doz.*	3,015	6,729	115,312	225,777
Bands	68,075	22,682	507,961	180,120
Erasers	28,056	16,286	400,576	239,179
Hard rubber goods				
Electrical goods	64,430	6,745	1,325,329	145,291
Other goods	......	13,445	......	227,577
Tires				
Truck and bus casings ... *number*	30,641	478,762	397,793	7,575,470
Other automobile casings ... *number*	64,653	465,382	1,372,782	10,518,032
Tubes, auto ... *number*	56,105	65,039	1,150,897	1,540,962
Other casings and tubes ... *number*	14,057	45,398	89,100	205,388
Solid tires for automobiles and motor trucks ... *number*	864	23,085	11,898	375,106
Other solid tires	168,460	19,425	1,700,828	223,001
Tire sundries and repair materials	......	45,166	......	814,847
Rubber and friction tape	87,678	21,405	1,121,817	295,528
Belting	171,308	74,761	3,191,417	1,382,149
Hose	264,659	76,647	4,753,252	1,388,449
Packing	64,592	30,226	1,274,820	525,267
Thread	104,779	68,330	1,586,412	1,206,104
Other rubber manufactures	......	79,970	...	1,612,035
Totals	......	$2,021,437	......	$36,713,920

Imports by Customs Districts

Crude rubber including latex dry rubber content

	January, 1932		January, 1931	
	Pounds	Value	Pounds	Value
Massachusetts	4.823.195	$228.283	3.040.824	$277.785
New York	53.667.380	2,511.537	71.032.238	6.359.453
Maryland	5.043.058	193.467	136,385	10,230
Georgia	1.102.920	36.787	....	....
Los Angeles	9.561.454	408.462	7.177.285	567.008
San Francisco	566,000	27,000	242.581	22.913
Oregon	22,400	1.199	42.560	3.595
Ohio	34.437	2.033	252.744	16.030
Colorado	336,250	19,350	56.000	4,285
Totals	75,157,094	$3,428,118	81,980.617	$7.261.299

Rubber Questionnaire

Fourth Quarter, 1931*

	Long Tons			
	Inventory at End of Quarter	Production	Shipments	Consumption
Reclaimed Rubber				
Reclaimers solely (5)	5,101	6,929	7,695	.....
Manufacturers who also reclaim (17)	8,221	17,618	4,671	10,791
Other manufacturers (78)	2,582	.....	.....	7,195
Totals	15,904	24,547	12,366	17,986

	Long Tons		
	Inventory	Consumption	Due on Contract
Scrap Rubber			
Reclaimers solely (5)	21,286	8,963	3,391
Manufacturers who also reclaim (17)	38,046	19,777	11,375
Other manufacturers (11)	504	.....	.....
Totals	59,836	28,740	14,766

Tons of Rubber Consumed in Rubber Products, and Total Sales Value of Shipments

Products	Crude Rubber Consumed Long Tons	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and Tire Sundries		
Automobile and motor truck pneumatic casings	38,034	$58,409,000
Automobile and motor truck pneumatic tubes	6,839	8,690,000
Motorcycle tires (casings and tubes)	41	143,000
Bicycle tires (single tubes, casings, and tubes)	236	475,000
Airplane casings and tubes	22	89,000
Solid and cushion tires	676	1,026,000
All other solid tires	77	204,000
Tire sundries and repair materials	821	2,410,000
Totals	46,746	$71,446,000
Other Rubber Products		
Mechanical rubber goods	3,662	$11,600,000
Boots and shoes	3,226	14,741,000
Insulated wire and insulating compounds	780	†4,264,000
Druggists' sundries, medical and surgical rubber goods	410	1,769,000
Stationers' rubber goods	273	341,000
Bathing apparel	120	123,000
Rubber clothing	242	933,000
Automobile fabrics	125	535,000
Other rubberized fabrics	654	1,613,000
Hard rubber goods	245	†1,183,000
Heels and soles	2,275	4,176,000
Rubber flooring	269	581,000
Sporting goods, toys, and novelties	316	920,000
Miscellaneous, not included in any of the above items	1,050	2,514,000
Totals	13,647	$45,293,000
Grand totals—all products	60,393	$116,739,000

Inventory of Rubber in the United States and Afloat

	Long Tons			
On Hand	Plantation	Para	All Others	Totals
Manufacturers	192,609	2,507	181	195,297
Importers and dealers	66,476	974	310	67,760
Totals on hand	259,085	3.481	491	263.057
Afloat				
Manufacturers	11,272	....	...	11,272
Importers and dealers	28,280	53	....	28.333
Totals afloat	39,552	53	....	39,605

* Number of rubber manufacturers that reported data was 166; crude rubber importers and dealers, 44; reclaimers (solely), 5; total daily average number of employes on basis of third week of October, 1931, was 113,058.

It is estimated that the reported grand total crude rubber consumption and the grand total sales value figures to be approximately 92 per cent; the grand total crude rubber inventory 84 per cent, and afloat figures 75 per cent; the reclaimed rubber production 95 per cent; reclaimed consumption 86 per cent; and reclaimed inventory 85 per cent of the total of the entire industry.

† One company did not report its sales, but did report crude rubber consumption, stocks, etc.

Compiled from statistics supplied by The Rubber Manufacturers Association, Inc.

London Stocks, January, 1932

	Landed Tons	Delivered Tons	Stocks January 31 1932 Tons	1931 Tons	1930 Tons
London					
Plantation	3.252	5,553	67,129	80,991	60,320
Other grades	35	38	37	49	41
Liverpool					
Plantation	*1.730	*1,253	*58,110	*43.292	*19,849
Total tons, London and Liverpool	5.017	6.844	125.276	124,332	80.210

*Official returns from the recognized public warehouses.

Classified Advertisements

CONTINUED

MACHINERY AND SUPPLIES FOR SALE

CALENDER: 60-INCH VAUGHN, COMPLETE WITH ALL ELECTrical equipment and used only 6 weeks. At present in Canada but can enter U. S. duty free. Complete details on request. Address Box No. 12,029, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES WANTED

WANTED: ONE 6-INCH OR 8-INCH HIGH SPEED TREAD TUBing machine. Must be in first-class condition. One late type tread die head. Furnish full details capacity, pounds per hour, h.p. required, length opening in die head. Quote lowest cash price. Address Box No. 12,025, care of INDIA RUBBER WORLD.

WANTED: A VULCANIZING PRESS WITH RAM 14 INCHES OR larger. Address Box No. 12,033, care of INDIA RUBBER WORLD.

Tire Production by Types

	1925	1926	1927	1928	1929	1930	1931
Balloon casings ...	20,750,000	29,100,000	34,700,000	51,900,000	51,400,000	42,300,000	41,300,000
High-press. casings.	40,000,000	32,400,000	29,700,000	26,100,000	17,300,000	8,625,000	6,700,000
Total casings....	60,750,000	61,500,000	64,400,000	78,000,000	68,700,000	50,925,000	48,000,000
Balloon inner tubes	21,420,000	31,300,000	34,300,000	49,200,000	48,700,000	41,300,000	38,880,000
High-pressure inner tubes.....	61,200,000	45,250,000	36,500,000	31,000,000	20,200,000	11,060,000	9,020,000
Total inner tubes	82,620,000	76,550,000	70,800,000	80,200,000	68,900,000	52,360,000	47,900,000
Solids and cushions	1,012,000	750,000	744,000	678,000	511,000	255,000	167,000

Automotive Industries.

"Compounding Latex"

In keeping abreast, as usual, with the most recent developments in rubber technology, INDIA RUBBER WORLD, beginning with its May issue, will publish **"Compounding Latex"** by Joseph Rossman, Ph.D., a series of technical abstracts from United States patents on the application of rubber latex in many diversified industries. These important articles are an exclusive feature with this magazine and can be had only by subscribing to it: $3.00 in the United States, $4 10 to Canada, $3.50 to all other countries.

Plantation Rubber Crop Returns by Months

Summary of 615 Producing Companies

	Br. N. Borneo (26 Companies)		Ceylon (102 Companies)		India and Burma (21 Companies)		Malaya (338 Companies)		Netherlands East Indies — Java (60 Companies)		Netherlands East Indies — Sumatra (60 Companies)		Miscellaneous (8 Companies)		Total (615 Companies)	
1932	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index	Long Tons	Index
January	351	71.8	1,300	63.7	214	38.1	14,371	115.6	2.792	106.3	4,712	116.9	213	117.7	23,953	107.1
February	331	67.7	751	36.8	86	15.3	11,857	95.4	2,755	104.9	4,088	101.4	125	69.1	19,993	89.4
Two months ending February, 1932	682	....	2,051	....	300	....	26,228	....	5.547	....	8,800	....	338	....	43,946	....
1931	838	....	2,914	....	557	....	24,569	....	5,651	....	8,045	....	355	....	42,929	....

NOTE. Index figures throughout are based on the monthly average for 1929=100. Issued March 10, 1932, by the Commercial Research Department. The Rubber Growers' Association, Inc., London, England.

Rubber Goods Production Statistics

		1931 Dec.	1931 Nov.	1931 Oct.	1931 Sept.	1931 Aug.	1931 July	1931 June	1931 May	1931 Apr.	1931 Mar.	1931 Feb.	1931 Jan.	1930 Dec.
TIRES AND TUBES														
Pneumatic casings														
Production	thousands	2,115	2,001	2,379	2,538	3,125	3,941	4,538	4,543	3,955	3,730	3,188	2,940	2,251
Shipments														
Domestic	thousands	2,171	2,223	2,185	3,034	3,845	4,244	4,320	4,197	3,804	3,143	2,580	2,855	2,550
Exports	thousands	54	87	96	111	123	125	137	135	142	155	142	140	139
Stocks, end of month	thousands	6,220	6,335	6,640	6,527	7,117	7,936	8,358	8,250	8,025	8,012	7,629	7,166	7,203
Solid and cushion tires														
Production	thousands	10	9	11	10	12	13	12	11	12	11	11	13	13
Shipments														
Domestic	thousands	10	10	13	12	15	15	14	14	14	15	12	12	12
Exports	thousands	1	1	1	1	1	1	1	1	1	1	1	1	1
Stocks, end of month	thousands	39	42	43	46	51	55	57	61	64	69	73	75	76
Inner tubes														
Production	thousands	2,078	1,955	2,462	2,759	3,548	3,964	4,286	4,330	3,693	3,560	3,133	2,898	2,448
Shipments														
Domestic	thousands	2,172	2,022	2,187	3.247	4,158	4,569	4,228	4,135	3,610	2,922	2,619	3,147	2,634
Exports	thousands	41	54	63	73	82	96	89	89	99	109	101	102	96
Stocks, end of month	thousands	6,338	6,496	6,657	6,476	7,019	7,672	8,403	8,439	8,330	8,380	7,937	7,552	7,999
Raw material consumed														
Fabrics	thous. of lbs.	7,981	8,361	9,263	9,585	11,745	15,140	17,085	18,010	15,244	14,041	12.002	12,738	8,358
Crude rubber	thous. of lbs.	25,237	25,922	28,372	29,854	36,232	46,697	51,280	53,418	45,016	41,851	36,651	36,319	25,537
MISCELLANEOUS RUBBER PRODUCTS														
Calendered rubber clothing														
Net orders	no. coats and sundries	13,654	14,341	20,925	23,966	21,580	17,932	21,161	19,380	16,846	19,380	16,361	21,884	12,881
Production	no. coats and sundries	16,221	23,255	19,773	22,728	27,080	14,431	15,419	18,094	16,803	19,220	18,276	13,059	20,791
Mechanical rubber goods, shipments														
Belting	thous. of dollars	....	483	601	788	802	914	798	790	832	889	722	759	675
Hose	thous. of dollars	....	856	972	1,041	1,161	1,436	1,650	1,857	2,129	1,892	1,611	1,440	1,337
All other	thous. of dollars	....	961	1,105	1,186	1,393	1,356	1,431	1,584	1,656	1,631	1,378	1,400	1,326
Total	thous. of dollars	....	2,300	2,678	3,015	3,356	3,706	3,879	4,231	4,617	4,412	3,711	3,599	3,338
Rubber bands, shipments	thous. of lbs.	231	197	225	201	195	246	209	215	259	231	222	211	165
Rubber flooring, shipments	thous. of sq. ft.	587	462	550	595	595	577	576	569	569	496	366	365	597
Rubber and canvas footwear														
Tennis														
Production	thous. of pairs	....	1,443	1,231	1,012	1,021	836	1,999	2,142	2,591	2,609	2,492	2,409	1,875
Shipments, domestic	thous. of pairs	....	446	589	1,263	1,223	1,520	2,657	3,316	4,049	3,107	2,688	2.377	871
Exports	thous. of pairs	....	29	44	72	29	125	100	121	150	236	200	110	175
Stocks	thous. of pairs	....	7,044	6,076	5,473	5,704	5,957	6,766	7,523	8,833	10,328	11,047	11,447	11,633
Waterproof, total														
Production	thous. of pairs	....	2,773	3,131	2,922	2,361	1,570	1,922	1,261	1,102	874	958	1,272	2,214
Shipments, domestic	thous. of pairs	....	3,186	4,318	4,185	2,842	1,510	1,229	626	1,070	944	1,015	1,549	3,888
Exports	thous. of pairs	....	59	153	186	151	117	108	50	72	53	92	74	63
Stocks	thous. of pairs	....	13,323	13,804	15,141	16,366	16,978	17,024	16,357	15,733	15,803	16,030	16,179	17,172
Grand total														
Production	thous. of pairs	....	4,217	4,363	3,934	3,382	2,407	3,921	3,402	3,693	3,483	3.450	3,681	4,089
Shipments, domestic	thous. of pairs	....	3,632	4,907	5,448	4,065	3,030	3,886	3,942	5,119	4,050	3,704	3,926	4,759
Exports	thous. of pairs	....	88	197	258	180	242	208	171	222	288	292	184	237
Stocks	thous. of pairs	....	20,367	19,880	20,615	22,070	22,935	23,789	23,881	24,566	26,130	27,077	27,627	28,806
Rubber heels														
Production	thous. of pairs	14,138	11,455	14,567	15,827	16,293	15,361	17,093	15,474	15,408	14,661	13,156	12,973	13,101
Shipments														
Exports	thous. of pairs	474	591	617	501	514	540	630	612	578	577	658	748	838
Repair trade	thous. of pairs	4,622	4,537	5,924	6,994	5,355	4,058	4,946	3,975	4,038	4,868	4,854	3,939	3,450
Shoe manufacturers	thous. of pairs	8,198	6,610	7,484	9,724	11,653	11,177	10,522	9,693	10,112	10,991	8,397	8,471	6,618
Stocks, end of month	thous. of pairs	24,405	25,213	24,652	23,952	25,832	27,006	27,898	28,491	27,764	26,708	29,335	30,302	29,741
Rubber-proofed fabrics, production														
Auto fabrics	thous. of yds.	380	394	445	528	596	531	701	982	710	738	644	577	476
Raincoat fabrics	thous. of yds.	931	1,267	2,476	2,988	2,226	1,843	1,355	1,066	1,040	863	567	738	697
All other	thous. of yds.	763	868	1,191	1,176	965	963	1,156	1,002	1,271	1,168	973	891	736
Total	thous. of yds.	2,074	2,529	4,112	4,692	3,787	3,337	3,212	3,050	3,021	2,769	2,184	2,206	1,909
Rubber soles														
Production	thous. of pairs	3,639	2,840	2,610	2,880	2,933	2,864	3,177	2,885	2,692	2,292	2,724	2,481	3,021
Shipments														
Exports	thous. of pairs	25	29	45	90	67	67	59	62	69	14	36	11	58
Repair trade	thous. of pairs	267	308	370	290	234	196	225	330	255	408	290	287	243
Shoe manufacturers	thous. of pairs	3.196	2,579	2.273	2,604	2.790	2.569	2,899	2,651	2,474	2,145	2,259	2,090	2,305
Stocks, end of month	thous. of pairs	2,018	2,180	2,153	2,264	2,395	2,475	2,461	2,655	2,764	2,876	3,167	3,032	2,917

Source: *Survey of Current Business*, Bureau of Foreign and Domestic Commerce, Washington, D. C.